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THE

U. S. NAUTICAL MAGAZINE,

AND

URNAL.

LY.

VOL. VI. & VII.

APRIL, 1857, TO SEPTEMBER, 1857.

NEW-YORK:
OLIVER W. GRIFFITHS,
No. 4 BOWLING GREEN.

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NAVAL JOURNAL.

Vol. VI.] APRIL, 1857. [No. 1.

STRENGTH OF VESSELS.

In this age of increasing light and progressive literature, it is most surprising that so little is known of the elements of rigidity in Marine and Naval Construction. To the flexibility of vessels, as a primary cause, we attribute many of the the disasters which so fearfully swell the list of shipwrecked hopes, and positive loss, both of life and property, in the United States. The most remarkable feature in the various subdivisions of maritime interests, and constructive art, is that of the *entire absence of science*, not only in giving form to this noble fabric, but in giving a degree of strength and power to resist the force of the infuriated elements she navigates, commensurate with the weight of the hull, cargo to be borne, and the *momentum* consequent upon the motion acquired by the wave. The strength of our ships is a question which should be regarded of sufficient importance to interest ship-owners and masters, underwriters and builders, upon whose judgment the mariner, the passenger, and the shipper depend for a safe transit, whether in crossing the ocean or in girdling the globe on the mighty deep. The determination of scientific questions in ship-building, is still contained in the unpublished volume of nature's laws and is left to be brought to light to a class of minds in which an original idea engenders a painful sensation. To such minds there is danger in every suggested improvement; with such obtuse perceptions, ignorance is safety, and prejudice is experience. With them the *great Architect of the Universe* has exhausted all his resources of science, and the world must needs move on in the same orbit in which they found it, lest they should peradventure be jostled out of a false position. They regard every man who would advance the science or art of ship-building, as a comm[illegible] my to the fraternity of owners and builders of ships; and if not m[illegible] but a few years since ship-owners and builders could be found in

York, who openly avowed such to be the fact. It would be well if this class of minds were confined to a single department of nautical commerce; but unfortunately, we encounter them amongst owners and masters, as well as in the ranks of underwriters and builders—their baleful influence has extended over both land and sea. With them, the longer the voyage, the greater the safety; the fewer the letters carried, the dearer should be the postage; the greater the tonnage, the safer the vessel, regardless of shape; the larger the premium, the less the underwriter's risk; the larger the frame, the stronger the ship. It is among this class of minds we may seek for the very men who once persecuted FULTON, MORSE, MAURY, and KANE; but as soon as those giants in science (by the energies of their own genius,) rose superior to the knowledge contained in the musty folios of the past, and the opposition of the present age, then this same class of men are found, on these questions, among those who glory in the developments of science. After having spent the flower of their days in damming up the channels of light, in barricading the avenues of human progress, they would now in the sorrow-stricken prudence of hoary years, secure a green sod for their graves, by chiming in with the echoes of praise to the scientific minds of the age. They are quite willing to allow the world to move on, (when they can hold it still no longer,) lest they should be forgotten in the prospects of the future; but while in the morning and in the meridian of life, science, in furnishing the scintillations of light, furnished no beauteous tints for their gaze. Such is the spirit manifested by at least two-thirds of the men engaged in nautical commerce. It is because merchants and ship-owners know so much, that ship-builders know so little of *mechanics*—it is because ship-masters are so confident, that underwriters are so ignorant of their true interests. We have but to compare other arts with that of ship-building, to discover how little is known of the elements of strength in ships. If a river is to be spanned by architectural skill, the laws of science are invoked; the extent of the span is determined, and a bridge is projected upon abutments, commensurate with the strength of the current and the length of the span. The strength of the laminated timbers is determined in proportion to the stress to be applied—the spandrels are increased in a determinate ratio with the span of the arch. Can as much be said of ships? We say, no. Would a civil engineer regard the *deflection* of a bridge uniting the opposite shores of a stream with indifference? Would he, in order to give security to the bridge thus deflected, increase the thickness of the transverse planking, and elevate the parapet? or would he not rather increase the vertical area of the spandrels, by increasing the spring of the arches? And is not a ship subjected to a greater number and variety of opposing forces than any bridge can be? Where and when has a ship been built that would bear her own

weight upon a single blocking midships, or upon a blocking at each extremity, without rupture? And yet this same vessel is designed for a common carrier, perhaps, of thousands of tons at a single load, and cannot bear the pressure of her own displacement, without defletcure from originality of form. The bottom of all vessels, as at present built, springs *like the bottom of a common kitchen tin pan*, while the sides show no deflection. The yielding or flexible property is contained between the sides. Just so with ships; first, the excess of pressure upward on the midship body, between the sides, causes the bottom to bow upward; when a sufficient amount of cargo is on board to balance the upward pressure by downward weight, then equilibrium is restored, and the bottom regains its original shape; but as the cargo is increased, the sagging form of keel is gradually increased, and the ship is sent to sea to be tossed about, at one instant with an amount of upward pressure midships equal to the weight of ship and cargo, at the next instant with but an amount scarce equal to the weight of the ship itself, while the ends of the vessel have been well nigh submerged. Now the keel sags downward midships, and as she mounts the next wave, and brings her middle to its summit, the keel bows upward, because the upward pressure of the water is greater than the weight of cargo and ship combined. This process of elevation and depression is going on all the while a ship is at sea, hence the reason why so many vessels spring a leak. If a ship is what she should be, why should she become leaky at sea sooner than when in port. The reader has but to refer to the list of disasters in the February number of the *Magazine*, and he will there find the bark *Laconia* reported as having put into Newport in distress; and it will be quite proper, in this connection, to state the cause of her distress. It was want of longitudinal strength. While at sea, and before entering port, she was leaking 600 strokes per hour, but as soon as she entered the harbor, her leak was reduced to 100 strokes per hour. A better demonstration of longitudinal weakness could hardly be required; and yet this was only a bark; had she been a larger vessel, she would have been set down in the list of foundered vessels—not because she was larger, but because this defect is greater in large than in small vessels. But it may be asked why we have set this vessel down as deficient in longitudinal strength, and how do we know, if so, that it was a want of more strength midway between the two sides, or along the line of the keel? We say first, that the strength or power of all vessels to resist torsion is in the planking and ceiling on the sides, but more particularly in the planking; hence we say, and speak understandingly, too, that whenever there is torsion in a vessel, the planking is too light. Now the planking takes a longitudinal direction, and if the weakness be in the covering, it must be longitudinal weakness. As to the second inquiry, whe-

ther it was the fault of the sides or the middle between the sides, we say that the strength of any and every fabric is only equal to its weakest part, and there is not a double-decked vessel in the United States whose longitudinal strength along the line of keel, bears a greater proportion to that of the sides than 2 to 5, while in by far the greater proportion of ships, it is only as 2 is to 6. In order to have a unit of strength in every part, the differential calculus must be resorted to. Now we say that a vessel would fare better at sea, if, instead of having all parts, save one, possessing a unit of strength, and that part having only two-fifths of a unit, it would be better that all parts had only two-fifths of the unit, so that equality of strength may be distributed over the entire fabric, and for the following reason: the vessel would be relieved of three-fifths of the weight of hull, and also of propulsory power; consequently the momentive surges would be greatly reduced, and the torsion would be reduced to a moiety instead of a full measure, while at the same time each part of the hull would be required to take care of itself, and not transfer, by weight and connection, its excess of momentive action to the weaker parts. There are a great many nautical men, as well as ship-owners—and we regret that truth compels us to add, not a few mechanics—*who think sufficieutly loud to give utterance to the idea* that if a vessel has an excess of scantling and siding size to her frame, she is and must of necesity be a strong vessel, whereas the reverse is strictly true, provided the reduction of the frame be added to the thickness of the planking. But it may not be quite clear to the mind of the reader why we attach more importance to the planking than to the ceiling of vessels for strength. First, we say that thick planking adds buoyancy to the vessel, as well as strength; second, thick ceiling adds cargo to the vessel, by diminishing the capacity for cargo; third, the outside planking is always of better quality of material than the ceiling, and consequently stronger, bulk for bulk; hence we would say to ship-owners, if you want a durable, and capacious ship, take from the thickness of the ceiling, and add it to the planking. If you would have a strong ship, see that you have a unit of strength in the line of the stem, keel, and stern-post; see that you have a unit, or an equal amount of strength, mid-way between the sides; and why? because you require—shall we say more? certainly not less, because the bulk of cargo is here distributed. There is more weight of cargo on one foot of the ship's breadth along side of the keelson, than in any other part of the hold, for two reasons; first, the vessel is longer here than in any other part of the hold, and second, she is deeper here than in any other part of the hold. With these facts before us, it must be clear that there is more capacity for cargo over and along side of the keelson, than in other parts of the hold. We have been told again and again that the keel and keelson form the back-bone

of a ship. *Then we say that all our ships have a disease of the spine, from which arise so many disasters*, and loss to life and property. Will the Board of Underwriters take note of this. As we have been requested by a gentleman from that quarter to write on the security and safety of vessels, we make the remark for their especial benefit. We are not of the number of those who regard two lengths of timber, scarphed together, as strong as if they were in a single piece, nor do we believe, with many others, that a single piece of timber can possibly retain its original strength after having a hole bored through it, even though the hole be well plugged, because we have proved the falsity of the premises. A mass of timber made up of several lengths does not possess strength proportionate to the mass, hence we say our ships increase in length and bulk faster than they increase in strength. The same remarks are equally applied to steamers. The engines operate very similar to the sea, in testing the strength of the bottom of a vessel. The planking of vessels, as well as the ceiling between the two sides, is but in single thickness, and that flat, with no advantage of scarphs. How, then, can it be expected that there should be any intrinsic strength in the bottom, beyond the amount furnished by the keel and keelson, which is insufficient, if suspended by their ends, or by the middle, to sustain their own weight, and would break asunder if subjected to the test. It will appear manifest, to every thinking man, that if two vessels were placed on the stocks, of equal bulk and weight, the one with an excess of frame, and reduced ceiling, planking, and keelson, the other with reduced frame, but increased ceiling, planking, and keelson, that the latter could be kept in shape with fewer keel-blocks and shores than the former. If this be so—and who will undertake to disprove it?—we say, is it not apparent that all of our vessels lack longitudinal strength midway between the sides, or in the line of keel, and that the flexibility of our ships is the primary cause of so many disasters. We say, then, in view of these facts, increase the strength of the bottom, by giving more keelson, until the middle of the ship is at least as strong as the sides. If this cannot be done with wood, use iron, which is lighter, less bulky, and also cheaper. The difference in the bulk of a wooden and a plate-iron keelson of equal strength, would afford cargo space sufficient to more than pay its first cost in a single voyage to Liverpool and back. Next in the order of weakness comes the bilge of vessels. It is not because there is less material in the bilge than in an equal amount of side surface, that the bilge is weak, and requires extra support, but because of its shape; and we may remark, in this conn tion, that the smaller the radius, or the shorter the turn, the weaker bilge; and although there is less cargo to be borne by this than other equal area of bottom surface, between the two sides of the

yet its weakness has been made manifest so often, and is so generally conceded, that it would seem to be unnecessary to demonstrate that which every man admits; but the cause of its weakness should be also known, or we shall fail to demonstrate the best mode of increasing its strength. The bilge of a vessel, unlike other parts, can yield but in one direction; if the more central part of the bottom yield, it may be upward to the pressure consequent upon the displacement, or downward by the excessive weight of cargo. The sides may form, (as they often do,) a different angle when at sea, on the one tack, than they do on the other, consequent upon the leverage of the masts, and the excess of strain on the weather rigging. Not so with the bilge. Forming, as it does, the connection between the bottom and sides, it must, of necessity, be subject to all the vibrations or transpositions of form, both in the sides and bottom, to which vessels are subject; and inasmuch as the radius of curvature can never be less than in the original design, it follows, as a sequence, that the strain of the spars, rigging, sides, and bottom, tends to enlarge the radius of the bilge, operating in direct lines, from the weather-channel, through the deck-partners down to the bilge. In addition to this, the strain of the caulking in the outside seams of the bilge has a tendency to enlarge the radius of the bilge, hence the very general expression, when rupture takes place—the vessel has bilged, or the bilge has broken outward at those parts having the smallest radius, or the hardest curvature. The butts in the frame, also, have a tendency to weaken the bilge, because of the difficulty in making an equal distribution of lap scarph in this particular part of the frame. In addition to this, the timber is seldom well grown, and as a consequence, the curvature is forced out of timber having a nearly straight growth. But there is another cause for the weakness of the bilge of vessels. If the entire vessel was so formed that a variable angular connection could be equally distributed throughout the vessel, then there would be no necessity for an excess of material in one part more than another; but such forms are not practicable for navigable purposes, hence the necessity of adopting other means for securing that necessary amount of strength which those peculiarities of shape required for vessels fail to impart. In order to secure a distinct and comprehensive understanding of this subject by the reader, we will examine the elements found in a cask, from which me may glean a few truths worth remembering. We may first remark that small casks are stronger than large ones, because the size and strength of the staves and hoops bear a more defined relation to the capacity than is found in large casks, and as a consequence, large casks are handled with a greater amount of care than small ones, because they are not as strong. The continued cause of this manifest weakness of the bilge of vessels may be found in the uncertain

means adopted of securing it to the sides and bottom. Ship-builders seem to regard the bilge as a separate and distinct part of the vessel, to be abandoned in the hour of extremity. How else can the present mode of securing the bilge to the sides and bottom of vessels be recognised. The side is a mass of materials constructed in the most advantageous manner for securing strength; and in addition to this, the frame is cross-plated with iron plates of considerable width. In order that the iron plate, as well as the planking, shall have the edgewise application of their strength, these plates are formed into a net or lattice-work of great additional strength, by being riveted together at the crossings. In this manner the sides are made excessively strong, equal to the weight of the entire ship and cargo, whereas the flexibility of the bottom and bilge exhibit all deformities from their original shape, which our dry-docks expose to the view of the observing man. As soon as the iron plating of the sides reaches the top of the bilge, it commences to change its position, and loses its strength, as applied to the vessel, in a corresponding degree, when an excess of strength is most required. The cross-plating, for example, may be five inches wide by five eighths of an inch thick. The sides obtain the strength of the five-inch bar, while the bilge has not even the strength of the five-eighth bar, inasmuch as the bilge is inclined to recede from the flat bar of iron outward, and all the strength that can possibly be obtained from the cross-plating in the bilge is received from the bolts which pass through the plates. The sides have no considerable extent of tendency outward from the plating, hence it is not difficult to keep the plating in its place, and, as a consequence, secure the whole strength of the iron; but if there was an outward tendency, the decks are competent to secure them, hence we are left in one of the weakest parts of vessel, with but a moiety of the strength of the materials of which it is composed, available for increasing the strength of this weaker part. There is the same difficulty in the thick work in the bilge. The bolts are the only support the bilge has. It has very little advantage from the strength of the timber, but must depend on the bolts and tree-nails almost wholly for support. The thick work inside takes the same direction that the bilge does, while the butts in the bilge follow in the same direction. How can strength be expected from a bilge thus constructed? Of what advantage is cross-plating to the bilge, toward keeping it from working outward, beyond the bolts which may be put into the thick work? But where is the remedy? We do not fill up the vessel with material, the strength of which is do[illegible]
How shall we secure the strength of the plates in the bilge as [illegible]
the sides? *By strapping on the outside instead of the inside.*
ping should be of round iron, of best quality, instead of fla[illegible]
quality—three-quarter inch bars, running from floor-head

three feet apart, crossing at right angles between the frames, and fastened at the ends, after being screwed tight, would furnish more strength than five-eighth by five-inch plates now do. This is applicable to coasting as well as sea-going vessels, and should be applied to all vessels, whether propelled by sail or steam. The present mode of plating the frame of wooden vessels is a positive wrong in war-vessels, for a two-fold reason: first, the danger of a shot, well-spent, striking those plates, and tearing and splintering the timbers and planking, and whether put on the inside or the outside. It is fearful to contemplate the effects of such a shot striking one of the plates of the frame; second, these wide plates keep out a large quantity of valuable fastening, both in the wales and batteries, whereas the round rods would not be liable to exclude fastening, would be more free from the chances of receiving shot, and would effectually keep the bilge up to its original curvature, and give it a full share of strength without bolts, being fastened at the ends; whereas we now act with the same amount of inconsistency that a cooper would who undertook to secure his cask by placing his hoops and girders on the inside, and depending on the fastening of bolts and rivets, filling up his cask, reducing its capacity, increasing its cost, and at the same time reducing its strength.

NORMAND'S MARINE BOILERS.

Mr. Charles B. Normand, of Havre, France, ship-builder, has introduced the following improvements in the construction of marine boilers, the object being to make them more compact than heretofore when required to carry a high pressure of steam. In the case of small war steamers, where it is required to set the engines as low as possible, to be out of reach of shot, instead of setting the cylindrical tubular portion of the boiler in the rear of the fire-box, he places it at the side, and causes the flame to pass to the tubes through a transverse fire-box. This arrangement reduces marine high-pressure boilers to about one-half the ordinary length, and dispenses with the space required at the back for cleaning the tubes. When more height is to be disposed of, he places the cylindrical part of the boiler immediately over the furnace. He also proposes an arrangement of marine boiler intended to supply surcharged or super-heated steam. The hot gases, after having travelled through the ordinary horizontal tubes, pass to a chimney through a number of vertical tubes, the lower ends of which are inserted in a horizontal plate riveted at right angles to the ordinary tube plate. To maintain a rapid motion of the steam round these heating tubes a screen-plate is provided, which separates them from the rest of the steam

chest. The steam collected at top by a pipe is admitted at one end of the rectangular space, and flows transversely to the other, where the steam pipe is affixed, after having gone across the whole range of heating tubes. He also proposes an arrangement for effecting the transmission to the feed water of marine boilers using the salt water of a great part of the heat contained in the "blow-off." The "blow-off" and feed-water are brought respectively into separate intermediate vessels, which are kept in communication at their upper parts by a pipe. The temperature of these vessels stands between that of the boiler and that of the hot well, but nearer to the latter in proportion to the excess in the volume of feed-water to that of the "blow-off" The steam generated by the reduced pressure of the "blow-off" passes to the feed-water, and, raising its temperature, is thus brought back to the boiler. A supplementary feed-pump is placed between the heating vessel and the boiler, and as in most cases the pressure in heating vessels will be below that of the atmosphere, the "blow-off" will have to be drawn by a pump. In vessels making long voyages it is often necessary to put down the fires in one of the boilers to clear the tubes. During this operation the steam supply is not only lessoned by the withdrawal of one of the boilers, but the draught of those under fire is much impaired by the rush of cold air ascending through the smoke-box doors of the detached boiler. To prevent this evil, Mr. Normand proposes to fit inside the smoke-box dampers moving on horizontal hinges, which may shut off all communication with the chimney while the tubes are cleaned. If partitions are provided in the fire-box to separate the flame and gases of each furnace, corresponding vertical plates may be set in this smoke-box; and thus some furnaces in one boiler may be kept steaming while the tubes over those adjoining are being cleansed.

Reform in the Quarantine Law.—A National Quarantine Convention is called to meet in Philadelphia in May next, to take measures to secure a reform in our Quaratine laws. A uniform system of quarantine laws, operating alike in all our seaports, we are persuaded, is not only desirable, but is highly essential, if we would remove many of the existing embarrassments to commerce. This prevailing and absurd inequality in the laws of quarantine, to which our commerce is made subservient, operates both oppressively and unjustly; for while those of some States are unnec[illegible]ly rigid when exacted, others again are so deficient in wise [illegible] regulations in their enforcement, as to be rendered alm[illegible] remove these well-known and serious defects in [illegible] tary laws, which, if worth retaining, should [illegible] sisted upon, or, on the other hand, abandon[illegible]

INACCURACY OF ENGLISH CHARTS.

The following from the English Nautical Magazine we deem worthy of a place in this journal.

One of the ways in which ships are lost has been recently pointed out in a letter, which, for the sake of keeping an evil before the world until it no longer exists, we have pressed into these pages. The way alluded to, however, is far from being new; but it is so far important now as showing that a condition still exists that should not be allowed when the means of correcting it are within the reach of any one who chooses to lay his hand on them.

Edinburgh, Dec. 29th

Sir:—I beg to call the attention of shipowners, ship insurers, masters of vessels, map and chart sellers, the Admiralty, the Trinity-house, and the public in general to the following fact:—I went recently from Liverpool to Glasgow by a steam-vessel, of which I enclose the name, but, as I do not wish to prejudice any ship or person, I leave the publication of the name to your editorial judgment. I examined the charts on board, and to my amazement I saw that Corsewell light-house (one of the most important light-houses in the navigation of the West coast, and the light for Loch Ryan—a refuge often sought by ships in bad weather) was on the chart actually placed on the wrong side of the point of land on which the light-house is situated. This statement will appear incredible to many persons, and therefore I give my name and address and the name of the ship. The fact can be easily verified. The Master of the ship was of course acquainted with the fact, and had marked in pencil the true position of the light; but is it not monstrous that charts, and recent charts, should be sold to ships with such a glaring error staring one in the face.

A foreign ship-master trying to make Loch Ryan with that chart would run his ship dead on shore, and an insurance company would be justified in refusing to pay the damage, on the ground that the ship was improperly found in the requisites of navigation. Corsewell is not far from Portpatrick, where the *Orion* was run upon the rocks and many lives lost; yet here are vessels navigating the same sea with a chart that is so execrably bad that scarcely a name on the Ayrshire coast is spelt correctly, and the soundings are atrociously incorrect.

Although a landsman, I happen to know something of that coast, and I would fain point out another circumstance. Ships are sometimes lost at Girvan and thereabouts. Within my memory several have been cast

away there, and if I mistake not, some india-rubber manufacturer had chosen one of those sad calamities for an illustrative drawing, in which one man is made to reach the shore. Yet on that same shore there is a reef about a mile from the land, within which reef any of those ships could have found shelter, even in the heaviest gale. Yet neither the reef nor the soundings are given on the charts used by the Glasgow and Liverpool steamers.

Will you allow me to point out another want in our coasting navigation? On the East coast of Scotland there is no point so important as St. Abbs Head. All ships making the coast of Scotland for the Firth of Forth would make St. Abbs if they could. All ships driven to the North of the Tyne (some I saw in this condition lately) would make St. Abbs, with its bold shore and deep water—not like the Isle of May, where a ship may be on shore before she knows where she is—yet ships are lost in St. Andrew Bay and elsewhere because there is no light on St. Abbs. Ship-masters in recent times have been punished for losing ships, but is there no punishment for the sellers of charts who sell rubbish that would actually lead a Master to lose his ship? Why not pass a law or an "insurance regulation" that no chart shall be considered official if it have not the official stamp of the Trinity-house or Admiralty? Is it not an infamous scandal that ships do actually sail with such abominable charts?

I am, Sir, your obedient servant,

P. Edward Dove.

To the Editor of *The Times*

Mr. Dove has alluded to all the possible consequences that might result from this glaring evil with a surprise that recoils from the discovery (to him) of a state of things which over and over again has been pointed out in the *Nautical* by the Captains of ships themselves. If he will turn no further back than to our last May number he will discover a nest of these errors from the hands of seamen, who are as anxious as he is to see correct charts sold by traders in navigation wares. But as yet we know of no means of preventing this evil. With respect to the errors pointed out by Mr. Dove, until a few years back the coast alluded to was only surveyed by the direction of the Admiralty, and it is quite possible that although the survey of the coast in question have been published since 1849, the steamer to which he alludes might have been navigated by an old uncorrected chart. Long, long ago, in the boyhood of this journal, we remember having experienced the same indignation as Mr. Dove appea[illegible] do, but those were days of inexperience, and we know better no[illegible] grown as wise as we ought then to have been. So, if Mr. I[illegible] desire to see other ways in which ships are lost besides this

lific one, we beg of him to refer to our volume for 1837, p. 723, and even that for 1843, p. 121, if they should be within reach, and in the mean time here is another recent illustration of some one or several of the methods there pointed out.

In our last number we inserted the letter of an officer who endeavoured to land a boat on that dangerous reef in the South Atlantic called the Rocas, a few miles to the West of Fernando Noronha, the position of which is very well known. The signals of distress seen by Captain Reynell of the *True Briton* appear by the correspondence of date to have been those of the unfortunate crew of the brig *E. D.*, of Liverpool, and her wreck affords another good illustration of how ships may be lost by a neglect of the most simple precaution.

PART I.—*The Departure from Port.*

The brig *E. D.*, 273 tons register, left Liverpool August 18th, 1856, for Pernambuco, and arrived there September 24th, making the passage in thirty-five days, leaving again October 29th for Liverpool, with a full cargo, comprising 150 tons of sugar, 1,411 bags of cotton, and a few sundries. At 6h. p.m. the pilot left the ship, and she proceeded on her voyage. On the 30th fine and clear, and light breezes.

PART II.—*The Wreck and Loss of the Vessel.*

31st.—Light breezes, with occasional squalls and dull. At noon took observation, lat. 4° 44′ S., long. 33° 46′ W., steering N. 3-4 E., going from six to seven knots. At 7h. p.m. ordered all hands on deck to keep a good look-out. At 9h. 30m. p.m. breakers were seen on the weather-bow; put the helm hard up, and before the ship wore off she struck with great violence on a reef; backed the sails and tried to get her off; sounded the pumps, and found six feet water in her hold. Ordered the luff tackle blocks to be got out of the forcastle to lift the long-boat out; found it impossible to get down, the forecastle being full of water. Sea, making complete breach over the vessel, washed away the boats and swept the decks; at which time several of the crew were washed overboard, but all regained the vessel with the exception of Antonio Hausen, of Denmark, who was never afterwards seen.

Finding ship breaking up, cut away the mainmast; the foremast went by the board at the same time. The starboard side of the ship then burst out, and port side also parted; then found the decks free as far forward as the after part of the fore hatch. During this time the wreck was striking with tremendous force against the rocks. Being in great danger, having nothing to secure themselves to, all hands prepared to leave the wreck.

Oaptain Wright having secured a box of blue lights, struck them as required, holding them so that we could see the rocks; we then scrambled on to them, and perceiving a large quantity of holes, we made for them, and, with great difficulty, all hands reached them, afterwards proving to be the starboard side of the ship wedged in the rocks; to which we secured ourselves till daylight, the sea breaking over us with great violence.

PART III.—*The Consequences,—in the Death and Sufferings of the Crew*

At daybreak (Saturday, November 1st,) saw two small islands about two miles North of us, also the house attached to part of the deck. Made for it, and, upon searching, found a few stores much damaged; about quarter of a hundredweight ship's bread, half a hundredweight coffee, one dozen case port wine, quarter of a barrel flour, twelve small tins preserved meats, a little Indian corn and calavances, two casks oranges, a few clothes, telescope, and signals.

Instructed all hands to secure everything to the house, which at high water, about 9h. a.m., we got off the rocks and commenced rafting towards the South Island; nothing else of the wreck was to be seen. Got about half way, and, the tide failing, secured the raft to a rock for the night. Being made fast, the Captain addressed the crew regarding their position, and they unanimously agreed to abide by his arrangements. He accordingly served out a glass of wine and about two ounces of bread each, and one tin preserved meats for all hands. Water we had none.

On tne 30th November, the barque *Melbourne* relieved the sufferers who remained alive, and conveyed them to London. Eleven of the seamen perished.

The North island is of an oval shape, extending East and West, about the same size as the South. This is all sand, no scrub at all. Both islands are surrounded by a reef or reefs of rocks, extending about five miles. The islands are strewed with much old timber, and we could distinguish five different vessels. We also found several human skulls, and many bones were scattered about.

By the time the reader has arrived at the end of the list of lives lost, he will find that, notwithstanding the unhappy crew (at least eleven of them) were looking out for two hours and a half on deck, (by which we i conclude that the Captain anticipated some danger,) they were all do to a miserable suffering ending in death from the wreck of their There was an ancient custom among other precautions of our fore of lying by at night, or reducing sail so much as would almost a the same thing, and a very excellent precaution it was. But such n

are too slow for these days, and the brig *E. D.* could not be expected to do this, but takes the precaution of setting all hands to look out in the dark for a low sandy islet with an outlying reef that is difficult to be seen in daylight. And this is all the precaution that appears to have been taken by her.

Now here is a vessel scarcely two days from port on her voyage home, and at noon on the day of her wreck she had, by her own account, the Rocas shoal due North of her not more than fifty miles. It does not appear whether she had a chronometer on board, but whether she had or not her real position must have been to the Eastward of where she supposed herself to be, as shown by the well-known *westerly* current which prevails there. But on she goes on a course N. 3-4 E., which takes her to those shoals, and which might have been seen by her chart—if indeed they really were laid down on it at all.

Now any discreetly managed ship would make allowance for a *possible error in position*, and knowing the set of the current would steer such a course as would, from where she was supposed to be, have ensured her going well clear to leeward of them, until she was to the Northward of their latitude, when she might again have hauled up on her course of N. 3-4 E. Had the *E. D.* done this all the miseries that followed would have been avoided. But no. On she goes on her course of N. 3·4 E. for the sake we may suppose of weathering them, and there is a look out kept by *all hands!* in the dark, for what can scarcely be seen in the daylight, until 9.30 p.m., when the first intimation that was *understood* of danger being at hand was breakers on the weather bow, and the next, which was pretty quickly after it, was the vessel striking on a reef and getting jammed between the rocks, a critical position enough, which requires the aid of a blue light to discover!! Was ever blue light applied to so unworthy a purpose. But it appears that a box of these articles had been happily preserved to light the crew to their miserable retreat among the rocks, and enable them to discover the differenee between them and the ribs of the ship. Were ever blne lights, we say, so degraded as to have to serve to discover wood from stone,—and then the next consequence of this series of blunders is another long series of sufferings and death.

Well, it is all over now,—perhaps even at the Insurance Office,—and the *E. D.* affords another instance in reference to How British ships are lost!

There is a strange fatality attending the merchantile marine of this country,—but Phœnix-like it rises from its disasters with fresh energies, and flourishes in spite of its bungling management. And yet it must nevertheless excite the observation of other countries, and they no doubt wonder at seeing it as fresh as ever. We have recorded in this work volun-

tary wrecks as well as those that were involuntary; but it is time that the character of our maritime service was placed beyond suspicion. Whether this vessel has been sacrificed at the shrine of mammon or from sheer stupidity, we hope will be decided some day by the Board of Trade.

RAISING THE RUSSIAN FLEET AT SEBASTOPOL.

When the English and French approached Sebastopol, the Russians, to protect their harbor, sunk at the entrance, between forts Alexander and Constantine, two 120-gun ships, two 88-gun ships, two frigates, and two corvettes. The line occupied by these vessels was about three-fourths of a mile long, and the water was about sixty feet deep. These vessels were the oldest and most inferior in the fleet. The great gale which subsequently destroyed so many of the English and French vessel in the Black Sea very much disturbed this line of sunken ships, and to prevent the entrance of their enemies, (which had become possible, but was not known to the English and French,) the Russians were obliged to sink a second line between fort Michael and fort Nicholas, at least a mile inward. When the Redan was captured by the Allies, all the balance of the fleet were sunk lest any should be captured. The machinery of the steamers was carefully covered with a preparation of tallow to prevent injury from the water, before being scuttled. Preparations for sinking the whole fleet had been made before the Allies appeared, for the Russians did not at first entertain the idea of defending Sebastopol. Their plan was to retire from the place, and one division of the army had actually advanced nine miles on the Perekop road when word was received that the Allies had halted outside, instead of entering the city, and were fortifying their position. Then the Russian army returned and made that long and able defence which won for the arms of the empire the highest renown.

We have before acquainted our readers that Mr. John E. Gowen, of Boston, has obtained from the Imperial Government of Russia the contract to raise the sunken fleet, and refit the vessels for use. There were no less than thirteen competitors for the contract from E[illegible]s, but what could be more natural than for the Govern[illegible] to an American citizen. The fame of Mr. Go[illegible] his competitors by his successful enterprise [illegible] steam frigate *Missouri* sunk at Gibraltar; but [illegible] to this exploit than to an act of generosity [illegible] t Mr. Gowan owes his fortunate selection as

It is related that it happened that [illegible] vessel

came into the harbor in a damaged condition. To her relief Mr. Gowan sent a number of his men, and refused any compensation for their assistance. This act of courtesy was remembered, and when the fleet was to be raised the government sent to the United States for Mr. Gowan, who at once proceeded to St. Petersburgh, and thence across the country to Sebastopol, where he made a personal investigation of the ships. He found the channel of the harbor was in the middle, with banks upon both sides, that of the north being of sand, and that of the south of mud. In the sand there were no worms; in the mud they were very numerous, The vessels exposed to their attacks are now of little value, but it fortunately happens that a small portion of the fleet were sunk so as to be exposed to their deleterious action. The following is a list of the vessels sunk: —

15 line-of-battle ships.	1 boom ship.
7 frigates.	1 ten gun yacht.
5 corvettes.	28 transports.
10 brigs of war.	15 steamers of war.
5 schooners of war.	19 merchant ships.
5 tenders.	In all 106 vessels.

The value of the above list of shipping is estimated at 65 millions of dollars.

The terms of the contract are said to be liberal, and are based upon a certain portion of the value of each ship raised.

The implements for raising the fleet will be taken from the United States, and go forward in two vessels which will sail from Philadelphia in April, 1857. Mr. Gowan's force will take the character of an expedition, the grandest for a similar purpose that has ever visited the old world from the new. The number of persons engaged to accompany it from this country is about one hundred and fifty, comprising ship-builders, calkers, machinists, engineers, &c. Some of the hydraulic machinery for raising the vessels is of the most colossal description, one cylinder alone weighing 54,000 pounds. The Russian government are to furnish a portion of the materials for raising the fleet, valued at $1,500,000. The time expected to be occupied in performing the contract is about eighteen months or two years.

At Kertch there are some five or six Russian vessels sunk, which are included in the contract; and in the harbor of Sebastopol are some $600,000 worth of chains and anchors, which the Allies threw over-board. The Russian Government has engaged to furnish from three to five thousand men, whose pay will not exceed twenty-five cents per day, they "finding" themselves. We trust that our self-made, enterprising countryman, will meet with entire success in prosecuting his magnificent engagement at Sebastopol.

THE VENTILATION OF SHIPS AND CARGOES AT SEA.

It is quite generally conceded that it is highly proper to secure a good degree of ventilation for ships and their cargoes, on most voyages by sea, but the best mode of accomplishing this object appears to be not generally known, while in another point of view an obstacle to the complete ventilation of the ship is thought to be found in the circumstances of the cargo on certain voyages. In other words, though it may be highly advantageous to ventilate the ship, the cargo may be constituted of such commodities as to suffer from a free circulation of air.

The variable temperatures to which a vessel is exposed in sailing from one part of the globe to another, occasion phenomena which are supposed to stand in the path of thorough ventilation, though it must be seen that in warm climates the temperature of a vessel is in great part determined by the quality of its ventilation. A vessel crowded with passengers, in a climate where the thermometer stands from 90° to 95° in the shade, and with all the side-ports shut up, as is required to be done in boisterous weather, needs some more effectual means of ventilation than the inartificial expedient of a windsail, which, under some circumstances, is inoperative, and which, if heavy rains occur, requires to be altogether removed. The same is true of a ship filled with cargo of a perishable nature, which requires for its preservation either the perfect exclusion of air or a circulation of pure atmosphere, of a proper temperature. So far as the case of wooden ships are involved, ventilation is required for their preservation—wood being vegetable matter, and liable to premature decay.

Perhaps one of the most deleterious agencies in promoting the premature decay of ships, and the damage of cargoes at sea, is inequality of temperature. Not only is the atmosphere subject to the greatest changes in climes and seasons, but the ocean itself has its thermal phenomena, which must be experienced. Add to this that certain commodities engender heat in a ship's hold, and we may perceive that no little wisdom and precaution are reqired to grapple successfully—because scientifically—with the subject.

As evidence of the general want of information upon the subject of ventilation at sea, we may instance the remarkable ruling in commercial circles, that neither the ship or underwriters hold themselves responsible for damage done to cargoes by *sweating and steaming*, in transit from port to port. Science appears to be regarded as impotent to protect the merchant from loss, in so small a matter that we blush to confess it.

The cause of sweating and steaming is the inequality and difference of temperature between the water and the air through which the

plows her way, and the atmosphere within her. It is a well-known fact in philosophy that where the air is warmer than the surrounding objects, the vapor in it will condense. The first effect seen will be the presence of moisture, the next, the accumulation of drops, which may increase in number and rapidity of formation, until the phenomena of rain takes place. Applying this explanation to ships, we discover that a vessel may sail from a warm climate, or pass from a temperate climate to a warm one, in either case the air in the hold, and between decks, will possess a high temperature. Then she may sail into a colder region, and as a consequence, condensation takes place under decks, and the moisture and wet is precipitated upon the cargo, which is damaged. The same phenomena must take place under certain circumstances at night, and in sudden changes of temperature from storms, &c. It has been reserved for vessels in the California trade to experience the worst effects of damage to cargoes from vapor condensation. Ships sailing from New-York for San Francisco in a few days sail into warm water and warm weather, and remain in it more than a month. Approaching Cape Horn, they come suddenly into cold weather, when the volumes of vapor absorbed by the heated air in the ship, are rapidly condensed, and fall like a shower of rain upon the cargo, and do not cease as long as the air outside is colder than it is inside. Having doubled Cape Horn, and sailed northward, the weather again becomes warm for several weeks; the ship and cargo are again heated by tropic atmosphere, and on approaching San Francisco the same process of condensation is repeated.

It has often been observed by us that clothing in the cabins of vessels becomes damp, from the causes above described, and this evil is greater in iron vessels than wooden ones. It is in part remedied by applying a lining of felt, stuck on to the iron by white lead. The cabins of iron vessels are usually lined with wood, which does not secure dryness, however. One man commanding an iron ship once accounted for the sweating by the pressure of the water *through the pores of the iron!*

By placing battens on the skin in a ship's hold, to prevent the cargo from coming in contact with the vessel's bottom and sides, the damage to cargo may be partially avoided; and a plan has been proposed by Mr. Hoyt, of San Francisco, for a double upper deck, to prevent damage from condensation of vapor in a ship's hold. This plan consists in ceiling the beams on the under side, thus forming air-chambers between them, to catch the sweat and leakage as it falls, carrying the water through a scupper between the timbers, before it reaches the cargo. We think this plan inadequate to fully prevent the evil complained of, forasmuch as the conducting quality of the sides and deck still remain, though it is true that the power of the latter would be diminished.

It is argued by a correspondent that if a ship be not ventilated, her cargo will be safe from sweating, &c., and that in some instances ventilation may be the direct cause of the sweating. In our opinion, thorough and efficient ventilation would go very far towards securing cargoes from damage by sweating and steaming. Ventilators are frequently stopped up at the bottom by cargo, and are often closed to keep out rain when they are most wanted.

Captain Dunn has communicated the results of an experiment in carrying wheat in bulk in the bottom of a cotton-loaded ship, to serve as ballast, in a voyage from New-Orleans to Liverpool. He kept the ship's ventilators closed during the passage, and turned out the wheat in good order, without having steamed or sweated the cotton, and he found that there had been no vapor condensation in the ship's hold, or between decks. He thinks it impossible to prevent this condensation of vapor in the hold, if the warm atmosphere be admitted through the ventilators, as the temperature of the air in the hold is less than that of the atmosphere above and around the ship.

It is not always the case that this is true. The outside air not only may be, but often is, in certain voyages, colder than the air in the hold. The state of the case is this:—when the air inside is colder than that outside, there will be no condensation of vapor upon the cargo, decks, and ceiling, and free ventilation may be permitted; but when the temperature is considerably greater inside, condensation will take place. It would certainly be found beneficial to adopt thorough ventilation as one of the most ready means of equalising the temperature indside and out; and we would not stop here, but adopt a method of *cooling the heated air* of the ship's hold, as temperate or tropic regions are approached, in conjunction with a free circulation throughout the ship. By the aid of a thermometer, it may be known whether the cargo is liable to sweating, and if so, refrigerating means may be adopted for its prevention. Not only can ships be ventilated, as they ought to be, but philosophical means may be employed to preserve their cargoes, and the health of the persons on board, just as well as to experience the penalty induced by neglect of it. We believe the very germs of that disease known as ship-fever are originated from the *dampness* and *foulness* pent up below decks, which ventilation and refrigeration would entirely remove.

Many of our steamboat cabins are afflicted with the evil arising from moisture lodging upon the bedding, and many a cold has been induced by sleeping in berths between sheets damp with condensed vapor from the vitiated air of the cabins. The cellars of the wretched poor in great cities are not more unhealthy than many ship's forecastles at sea, and from the same causes. Who will first apply the full light of philosophy to the subject of *ventilating and regulating the temperature of ships and their cargoes.*

OUR NAVY.

HOW SHALL IT BE IMPROVED?

WE deem this a most appropriate season to speak of the present condition and future wants of our navy. It is not because we have not before shown some of its defective workings, but because this is the time, and the only time, to remedy the evils of which we propose to speak, and of which the entire nation has just cause to complain. The first few months of executive administration will, (as it always has,) determine whether the Hon. Secretary will govern the navy, or whether the navy shall govern him. We are friends of the navy, understand its condition, and know something of its wants, but cannot be induced to tune our lyre to the music of praise in advance of its commendatory acts. A brief review of the Hon. Mr. Dobbin's course may serve a two-fold purpose—it may serve as a point of departure for the Hon. Mr. Toucey, as well as for our remarks. Mr. Dobbin was one of the most zealous friends and advocates for improving its condition, the navy ever had in a Secretary. He entered upon the duties ef his office with a strong desire to correct its errors; but having, at the commencement of his term of service, *substituted his own individual responsibility for that of the bureaus of his department*, he at once found himself in shoal water, and grounded at every effort to change the "*customs of the service.*" Instead of making suggestions to the chiefs of his bureaus, and, when satisfied, permit them to issue orders in detail, for work to be performed, he allowed them to make the suggestions, while he gave the order, and thus relieved them of that accountability to which they should be held subject; and having commenced this course, he could not easily change, inasmuch as it conformed to former usage. In remarking to a friend that he was disposed to call a court of inquiry, in order to determine where, or to whom the blame should be attached, for a certain miscarriage in the constructive department of one of the vessels belonging to the navy, said the friend to him, *you dare not!* Why? said Mr. Dobbin; because, said his friend, *you gave the order*, and you are the responsible party, as it will be made to appear. The investigation did not take place.

But in order to show how completely the navy ruled the Hon. Secretary, when interest rendered it necessary, we may cite another case in point. A friendly naval expedition, as is well known, was fitted out to Japan, the cost of which exceeded the estimate, by a very considerable amount. Mr. Dobbin, in his report to Congress, complained of the expense of keeping large steamers, such as the *Powhatan*, on foreign stations, and asks of Congress seven hundred thousand dollars to make up the deficiency. Con-

gress, willing to encourage his zealous endeavors, gave him the amount. The bills were paid, and what next? He then asks for six millions of dollars to build war steamers, and (as his, own good sense would have taught him) to be of smaller size than the *Powhatan*, in order that they might be less expensive; but no—still larger, and much more expensive, both in first cost and to keep in commission. But it may be said, perhaps, they were not designed for a foreign station, and would not be as expensive at home. We reply, emphaticallly, that they could not have been built for home service, as they draw too much water. There is but few of our harbors they can enter, on account of their great draught of water. The reader will pardon the digression, we could not escape the thought that if there had been war between England and the United States, consequent upon a disagreement upon the Central American question, England might have deemed it advisable to send a few of her light draught gunboats on our coast. These vessels can sail or steam up almost any of our small rivers, and lay secure against any attack from the combined efforts (from on ship-board) of all the steamers and sailing vessels of the United States navy, and these gun-boats, let it be remembered, range from 700 to 1000 tons. They are even larger than the old sloops of war of our navy. But to return to our subject. This is not all Mr. Dobbin intended to do; he asked Congress for an appropriation to build several steam sloops of war, of *light draught*, and this light draught, by the advice of his counsels, he sets down at *eighteen feet*, three times as much as some of the gunboats which we have referred to draw, and certainly one third more water than they should draw had they been built. As it was fairly and reasonably expected, Congress passed the bill authorising their construction; but if they are to be made to draw eighteen feet water, it would have been better to have waited, without them, until better counsels prevail. Twelve feet is the utmost extent of draught to which these steam sloops should be subjected, and within that draught a faster sailing and more efficient vessel may be had, than can be found in this or any other navy. The efforts of Mr. Dobbin to secure efficiency in the *personnel* of the navy are equally manifest. The "Efficiency Act" of Congress has engendered more ill-feeling in the navy than ever before existed, and will ultimately fail of accomplishing that which was honestly intended as a wholesome measure in the channel of reform; and why does it fail? simply because Mr. Dobbin assumed the responsibility to which he should have held others. Query, why did he approve (and thus become responsible for) the report of the *Council of Fifteen*, without having first examined their minutes. The Hon. Secretary should have been the first party to have known that there were no minutes kept of their proceeings, and if a proper amount of scrutiny had been exercised on his part, the report would

have been returned to the Board with his censure. If there had been minutes kept of the proceedings of the first board, Mr. Dobbin would have been able to determine what kind of testimony had been adopted in making up their decisions; and after having required them to correct their errors, he could then have signed their report. With such an amount of caution on his part, he could have secured the confidence of the navy, and been in position to correct any errors that might have occurred. By signing the report of the Council, he became a party to whatever of injustice it contained. And when it is remembered that the Council kept no minutes of their proceedings, the conclusion is irresistibly drawn, that either the Hon. Secretary must have known of the omission of common justice to their brother officers on the part of the Council, or that he was the Secretary of the Council of Fifteen, and not ot the navy.

We hope the Hon. Mr. Toucey will profit by his example, in the new steam sloops of war, and authorise the construction of vessels adapted to the wants of the country, and not be wheedled into the responsible position of giving orders in detail.

A steam sloop of war, if adapted to the wants of the service, would be the most efficient vessel in the navy. The true principles of naval adaptation may, in this class of vessels, be practically developed, *in small ships with large guns.* A vessel of this class should have, in addition to her gun-deck, a light spar-deck, upon which to work ship. Upon this spar-deck a pivot-gun of 10-inch bore may also be worked, while upon the gun-deck a battery of at least 10 8-inch shell-guns may also be carried. The model of the vessel should be such as would have direct reference to practical stability at sea, in order that all the guns may be unloosed and worked in any and all weathers. She should be propelled by a submerged screw of at least 10½ feet diameter; the deep load-line being not over 12 feet draught of water. The two-bladed propeller has proved to be the most efficient of the submerged class. With such an arrangement, the screw need not be raised out of water, and an average speed of 9 knots be obtained under sail, and of 10 knots under steam alone; with steam and sail combined, 13 to 14 knots may be obtained. She may have capacity for 20 days' coal, her consumption not exceeding 15 tons in 24 hours' steaming. This can be furnished on the draught of water already named, 12 feet, and the vessel's motions be so easy and so much reduced as to render the guns available in bad weather at sea, whereas they are now useless on three-quarters of our ships, particularly those of the largest calibre. This is a new feature in naval gunnery, but entirely feasible, the antidote being in the model of the vessel. But how shall such ships be obtained? Surely, if experience is worth anything, marine architects have had more than naval architects. If the marine architects of the United

States are employed to model war-vessels for other governments, as they are, surely they should be competent to model for their own country; and we can discover no reason why they should not be the best-informed men in the world upon the philosophy of shape in vessels, unless it be that they shall be like the ancient scriptural prophets—have no honor in their own country, but obtain it from abroad. Let the model and specifications be right, and all will be well.

RATES OF COMMISSIONS.

Recommended by the Chamber of Commerce to be charged where no express agreement to the contrary exists.

The Rates of Commissions having been recently revised by the Chamber of Commerce, we publish below the amended list:—

BANKING.

	per ct.
On purchase of stocks, bonds, and all kinds of securities, including the drawing of bills for payment of same	1
On sale of stocks, bonds and all kinds of securities, including remittances in bills and guarantee	1
On purchase or sale of specie and bullion	¼
Remittances in bills of exchange	½
Remittances in bills of exchange, with guarantee	1
Drawing or endorsing bills of exchange	1
Collecting Dividends on stocks, bonds, or other securities	½
Collecting interest on bonds and mortgages	1
Receiving and paying moneys on which no other commission is received	½
Procuring acceptance of bills of exchange payable in foreign countries	½
On issuing letters of credit to travelers exclusive of foreign bankers' charge	1

Where bills of exchange are remitted for collection, and returned under protest for non-acceptance or non-payment, the same commissions are to be charged as though they were duly accepted and paid.

GENERAL BUSINESS.

On sales of sugar, coffee, tea and general merchandise, usually sold in large quantities, and on credit under 6 mos	5
On sales of manufactured goods, and other articles usually sold on long credits, for 6 mos., and guarantee	7½
Do. do., for cash	5
On purchase and shipment of merchandise, with funds in hand, on cost and charges	2½
Collecting decayed and litigated accounts	5
Effecting marine insurance, on amount insured	[illegible]

No amount to be charged for effecting insurance on property consigned.

Landing and re-shipping goods from vessels in distress, on value of [illegible]

Do. do. on specie and [illegible]

Receiving and forwarding merchandise entered at custom-house, on invoice value 1 per cent., and on expenses incurred 2½

On consignments of merchandise withdrawn or reshipped, full commissions are to be charged, to the extent of advances or responsibilities incurred, and one-half commission on the residue of the value.

On giving bonds that passengers will not become a burthen on the city—on the amount of the bonds 2½

The risk of loss by robbery, fire, (unless insurance be ordered,) theft, popular tumult, and all other unavoidable occurrences, is, in all cases, to be borne by the owners of the goods, provided due diligence has been exercised in the care of them.

SHIPPING.

On purchase or sale of vessels 2½

Disbursements and outfit of vessels 2½

Procuring freight and passengers for Europe, East Indies, and domestic ports ... 2½

Procuring freight and passengers for West Indies, South America, and other places 5

Procuring freight and passengers for foreign vessels, in all cases 5

Collecting freight 2½

Collecting insurance losses of all kinds 2½

Chartering vessels on amount of freight actual or estimated, to be considered as due when the Charter parties are signed 2½

But no charter to be considered binding till a memorandum, or one of the copies of the charter, has been signed.

On giving bonds for vessels under attachment in litigated cases—on amount of liability 2½

The foregoing commissions to be exclusive of stockerage, and every charge actually incurred.

THE STEAMSHIP AMERICA.—We learn from private letters that the steamship *America*, which was built by William H. Webb, last summer, and about which there arose some misunderstanding at a South American port, a British admiral being determined to sieze her as a Russian vessel, has entered the Amoor river, in Siberia, and was there sold to the Russian government. The letters which have been received, express the warm admiration of the Russian officials in their examination of the steamship, and speak of the excellence of her qualities, displayed as a sea-boat. The perfection of her engines is also mentioned. She was put in commission the day after her transfer to the Russian government, and sent off on a cruise, though having just completed a voyage of thousands of miles.—*New-York Courier and Inquirer.*

COASTING IN JAPAN.

VOYAGE OF THE VINCENNES' LAUNCH FROM SIMODA TO HAKODADI.

Continued from page 422.

ITS base was of trap rock, forming a succession of steps or regular ledges, overhung by cedars and shrubbery. As we entered the opening, we perceived a little hamlet on the shores of the inner harbor, so completely shut in that we had not even suspected its existence. A number of boats, filled with men, women, and children, came to us, and when we dropped the anchor, and hauled in to the rocks, they followed. A fire was kindled with dried branches of the cedar. The rocks were covered with mussels and oysters, the former preferable as food. A species of sorrel, and some wild onions, were eagerly gathered by the crew, and with the addition of a number of fine fish, given us by the Japanese fishermen, we had the materials for an excellent repast. Our buttons were in great demand, for they passed current as specie, and happy was he who obtained them. The Japanese themselves manufactured metal buttons, ornamented with raised figures ; but a high degree of mechanical skill and much labor are required so that they are costly. There were a number of girls among our visitors, and one or two quite pretty ones. At noon the sun was shining with great brilliancy, and the sextant with which his meridian altitude was observed excited much curiosity. They were much gratified in being permitted to look through the small telescopes attached to it. On the shore were drying fish and nets. A flock of wild gulls were standing on the rocks, reflected in the mirror beneath them. A light air sprung up, and we wished that we could remain in this pleasant cove, where all was so quiet and agreeable.

We availed ourselves of this opportunity to cook provisions enough for several days, the seamen having no better adapted instruments for the purpose, thrust their boarding-pikes into the pieces of salt beef and pork, to wash them in the sea, and free them of brine, an operation which attracted the attention of the Japanese, who seemed to think the sailors quite familiar with the use of those formidable weapons. In Japan, arms are usually kept covered, and it is with difficulty that the wearer of a sword can be prevailed upon to draw it for inspection. Their arms are always highly polished, and very sharp, but though exeeedingly hard, they will not bear bending. The steel is probably tempered like that of our files. To bend one of our swords was considered very surprising, and though ours could not boast the fine polish of theirs, they had been sharpened on a grindstone, and the wire edge, as explained to them, cut dreadfully.

It was not our policy to permit them to boast of anything of that description without showing them that different people knew different things. These explanations were usually received with three or four long-drawn groans. Just as we were preparing to leave, a boat, with the officials we had left in the morning at Isokona, entered the cove. They bowed to us, and pulled towards the village. Several boats followed us out, for they were determined to see all that could be seen of the launch. The swift current catching us near a rugged rock, where an overhanging bluff caused an eddy in the wind, nearly wrecked us, but resorting to the oars, we cleared the danger. The wind freshened, blowing quickly out of the bay, and under all sail, we sped rapidly towards the sea.

But with the loud wind rose threatening clouds, hiding the peaks of the mountains; and the mutterings of distant thunder warned us of an approaching gust. Some fishermen employed in the bay were seeking shelter, and when they saw us, waved to follow their example, holding up to our view some fine large fish, of a light red color, which they wished to give us. We luffed to, and without hesitation they passed them into the boat, asking no remuneration; but we gave them buttons, hooks, and lead, with two or three knives.

Among those who came from the shore was a man of superior condition. He was furnished with a beautiful lacquered box, divided into compartments, containing a variety of eatables and relishes, with a reservoir of strong saki. This box he passed into our boat, inviting each of the crew to eat and drink. The saki seemed to be more highly appreciated than any other portion of its contents, though our crew was as modest as well bred men should be, and contented themselves with moderate draughts upon his benevolence and his flask. Our brandy was tasted by the Japanese, and, when well sweetened, possessed a strong affinity for them. As the thunder grew in intensity, as the sky became ominously dark we determined to follow the advice of the fishermen, and seek shelter.

Meanwhile several boats emerged from behind a curving point. They brought the principal people of a second village, which, like the first, was hidden by intervening hills and jutting promontories. They repeated the warnings of the fishermen, first pointing to ths rising clouds, then to the harbor whence they came, and lastly to the sea, shaking their heads significantly.

They even offered to tow us into port, and to test these kind invitations and offers, we accepted the proposal, and threw them a line for that purpose. They immediately made fast, and sweeping their powerful oars, gave us good headway. We then manned our oars, and the crew, not willing to be excelled by these orientals, gave way with a will, making the spray fly from the bows. But although the attaching line was slackened

by the effort, the Japanese, by corresponding exertion, managed to keep from being run over. To show them the power and accuracy of the rifle, one was fired at a gull sitting on the rocks, within range. The bird fell, but the Japanese requested us not to repeat the shot. The rain now began to fall, and having anchored in the most sheltered part of a very fine harbor, immediately within the recurving point, we hastened to spread our painted canvass roof, and to make preparations for a night's stay Our friends were invited into the boat, beneath the shelter of our tarpaulin. We smoked, conversed, and spent quite an agreeoble evening. A fire was made on the shore, by the side of a rivulet, and the men prepared supper. From where we were anchored, not a glimpse of the open water could be had, so completely were we shut in. The shore was of sand and pebbles, with fragments of quartz, and was overlooked by a precipitous hill, covered, as is nearly all that land, near the water, by majestic cedars and thick undergrowth. Contrasting with the deep green foliage, were white and yellow lily-like flowers, borne by trees. We collected specimens of all the plants in flower, for the botanist of the expedition. To Mr. Berry was assigned the care of their preservation, and he availed himself of every opportunity to enlarge the collection.

After the press of the crowds off Arva, and at Isokona, we were not much amazed by the more limited and orderly congregation from the villages. But some individuals jumped slyly on our poop, and as we did not wish to repulse them rudely, we resorted to an expedient. The experiment was tried on a bold and fearless fellow, who stood with a very independent air on the poop. One tube of a common copper pump, such as is used in boats, or for emptying casks, was pointed at his feet, which were bare. His companions looked on with much interest. At first he did not deign to move, but at length his imagination caused him to lift one foot. The tube was instantly pointed at the other, which was as quickly withdrawn. Having performed a *pas seule* for a full minute, he bounded out of our boat into his own, amid roars of laughter. We then exhibited the harmless tube, and the man was so completly crest-fallen that he kept at a distance ever after. In entertaining our friends, a glass of brandy had been prepared for an elderly gentleman. As he merely sipped it, we supposed that he did not fancy it much, and as Brown, the quarter-master, seemed to eye the process with lively interest, it was suggested to him to show the Japanese how to drink brandy and water when tumblers were scarce. Brown reached over, and the old gentlemen, bowing, handed him the glass, while the contents were disappearing with amazing celerity. But such was not the disposition of our guest. In a twinkling he seized it, and with one motion, swallowed it. Then, turning

his features into a merry grin, and looking askant at Brown, he seemed to say, "Impulse is a great thing."

This old gentleman and a companion younger than himself, esconced beneath our tarpaulin, were interested in everything we showed them. The illustrated books were again exhibited, and some time was spent in examining the various plates. As before, the lion, the tiger, the giraffe, and the hippopotamus excited admiration. As tokens of their esteem and souveniers, they exchanged with us trifles of various kinds. They often wear bunches of little ornaments, as our ladies wear armlets or charms, and among these trifles were some bells of singular purity of tone, tinkling as the wearer steps. The Japanese seem to study all the little enjoyments of the senses, and there is so much poetry in their character that doubtless in wandering among their pleasant groves, by the side of rippling streams, these melodious silver sounds are sweet and soothing. These things are trifling enough to be amusing, yet no inconsiderable portion of the time, sensual repose rests upon no better foundation. They are a dreamy people, forever in the shade, drinking tea, smokiug, and looking up at the clouds in the sky.

With the Loo Chooans, this characteristic system of dignified idleness has led to the remark, that the people of that island "study deportment and review the history of their ancestors."

But to return. We received from these good people specimens of bronze coins, and a bank note of small value, which was the first paper money that we saw.

While thus pleasantly engaged, our persistent friends, the officials of Iokona reappeared, at their head the redoubtable Capt. Rice, whose beaming countenance was hailed by the crew with a simultaneous cheer of welcome. He hastened to produce buckets of the grain after which he had been named, and some radishes and eggs, the latter covertly as before. In addition, he presented to Lieut. Brooke a complimentarry casket of bon bons, in the form of turtles, stars, and circles, &c., also a little bamboo box. In return he was presented with some books, among them an illustrated work on conchology, interesting to him as an evidence of the character asserted in the letter.

The fishing boats that had entered the harbor with us were going close by, and we were much amused by the exhibition of cunning on the part of a crow.

One of those birds was perched upon the stem of a boat, in the bottom of which were a number of small fish. The crow seemed to be aware that the fishermen were occupied with us, and first looking cautiously round in the most suspicious and enquiring manner, he suddenly hopped

down into the boat, seized a fish and was off to the woods in a twinkling. He would then return, look round, waiting some time until he thought himself unobserved, then down again and off. This manœuvre he repeated several times until, commiserating the poor people whose property was being thus spirited away, we called their attention to the robber. At sunset they requested that the men on shore should return to the boat, and as we had no particular desire to remain, their request was complied with. Had we persisted, however, their objections would have been withdrawn. We were convinced in our intercourse with them. that much of the respect they showed us was due to the display of a good supply of offensive weapons.

At night they still remained about us, and offered portions of their evening meal to several fishermen, inhabiting boats thatched with straw, impenetrable to the rain, and they exhibited to us with some ostentation small sums of money. One had a large bundle of notes wrapped in several papers, then rolled in grass cloth. We experienced a slight emotion of pity in regarding these efforts to increase our respect for them, and the complacent air with which they replaced these laboriously acquired treasures, as if they thought we regarded them with more respect.

The morning came clear and bright. With a convoy of boats we left the harbor. There were twenty-six of the large fishing boats already engaged in their occupation, and we saw moored out in the bay an object which at once roused our curiosity. A platform or caged structure supported on poles fifteen or twenty feet above the surface of the water, braced by numerous large ropes as stays. Around it was a large net marked by floats of wood three or four feet long and one thick The net nearly encircled the platform, with a radius of a hundred and fifty yards. A number of look-outs were perched on the top of this structure. The mode of operations appears to be this: an opening is left in the net, through which the fish enter. When a number are observed within its limits, the entrance is closed by means of ropes in the hands of the watchers. The net is then gradually contracted until the fish are gathered in its folds. We had not time to make a close examination, but luffed to for a moment to receive some fine fish that were given us.

It now became necessary to bid adieu to Capt. Rice, whom his boat still followed. He repeated over and over again that the great man was coming, and that all the luxuries of the country would be showered upon us if we would only stay. Extending him a hand to bid him farewell, he supposed it to be an invitation to come on board, and forthwith stepped in. When at last we shook hands with him, and pointed to the open sea, he seemed deeply grieved, and, retiring to his boat, was seen standing in the bow watching us until no longer within the range of vision. The kindness

of this man made a deep impression on our crew, and he was often the subject of conversation.

Near the east cape of Sendai Bay are three Islands, one immediately off the cape to the east, with a narrow channel between it and the main; the others within the limits of the Bay. Good harbors are formed by them, particularly on the north side of the southern island. But a ship would find a more convenient and roomy berth in the larger coves of the Bay. There are picturesque villages in all these bights, but not visible from the Bay. The island east of the cape rests upon a trap foundation, and rises to a conspicuous peak four or five hundred feet in height, rocky and wild. On the verdant highlands of the main, near the cape, were horses feeding. We observed that in the construction of many of the houses slate was used for the roofs.

The day was lovely, and we glided along in pleasing solitude until we came to several fishing boats, differing from all that we had yet seen; they were small, carrying only two men, who appeared to be of the lowest order. They were in pursuit of, or in waiting for, some fish, which they take with the harpoon.

They had some shell-fish halicots, very similar to those of California, and they gave us many shells, which the crew hung in wreaths over the sides. Several large black albatrosses were swimming lazily around, or gliding in the air, on their huge extended wings, waiting to share the spoils of the fishermen. During the middle and latter part of the day, a fine breeze blew from the south south west, and we ran, during that time, 43 miles. The land was high and broken, with pyramidal peaks. The sun went down clear, but yellow, a thin haze obscuring the land. The increasing wind caused the boat to bury her bows, and to threaten broaching to. The mainsail was reefed, and with reduced speed we kept on our course. We saw one sun-fish—a white mass several yards in diameter, gleaming a fathom beneath the surface. The sea grew rough, still we considered the weather good, as it permitted us to carry on the survey of the coast. The high land of Sendai in sight astern. At sunset we were several miles to the southward of Oho Sima. During the night the wind moderated. In the morning it was nearly calm, the weather fine. The confined quarters to which we were limited caused an intolerable longing for a run on the land so temptingly spread before us. The high peaks obrerved at sunset of the day before were still in sight, although we had added, during the night, forty miles to our run. According to our experience, the winds usually fall at night and set in at ten in the forenoon, but this morning was an exception to the rule. The deep blue water was unruffled. The scenery was very fine—distant mountains veined with snow, while the nearer hills, with rocky and precipitous bases, were cov-

ered with cedars. Fragments of pumice-stone, which the men at first supposed to be bread, thrown overboard from some ship, floated by us. Numerous medusæ and welell were moving slowly about, while a troop of porpoises lashed the sea into foam. Light and baffling airs sprang up, and we remembered that during the night the stars appeared unusually large, and the dew fell in great drops. In the course of the afternoon the wind came out from the north-east, then hauling more to the north, was dead ahead. A bank of fog rose on the horizon, so we ran into an open bay, passing on our way two islands, forming harbors, to which slopes a charming valley, well cultivated. Its long and even surface varied in hue from light to deep green. The point forming the northern shore of the bay is separated from the main by a narrow channel, but is scarcely entitled to be termed an island. A boat was seen pulling out from this channel, which was too shallow to admit the launch. A few horses were visible round the angle of the abrupt rocks which come to the water's edge; but as the evening was near, we feared being entangled in the shoals, and running back to the nearest island, anchored under its lee. It was of oval form, about three hundred yards in length, and thickly wooded, presenting the usual foundation of trap rock, rising, in this case, to a height of fifteen or twenty feet, and very regular in its form. A convenient cove lies on the river-shore of the island, and some fishermen have there a house in which they reside permanently. It was quite a picturesque and romantic place. A rustic bridge led from the massive fragments of gray basalt, that cumbered the shore, to a level space on which the house was built, sheltered by a high bank. A narrow path led to a spring of very cold water. The trees formed a pleasant background. There were several large dogs loitering about, and others barking in the woods. Occasionally we heard the shrill call of the chanticleer, that feathered songster of the morn. The air was fragrant with the perfume of flowers. Moss roses of large size and singular beauty grew wild.

The inhabitants of this retreat were more timid and reserved than any we had yet seen. They seemed, indeed, to fear us very much, and it was not until we made them laugh by some jests that they became confident. Nothing drives away suspicion sooner than an unaffected laugh. We repeated such words of their language as we thought most easily understood. We said that we were thirsty, that we were cold, and much more; that we threw ourselves upon their hospitality. Soon they regarded us as agreeable companions; added fuel to the fire, gave us water, and handed us their pipes to smoke. They wished us to accept a present of tobacco, but we refused.

The night passed pleasantly, and having gathered some refreshing boquets of dewy flowers, we said good-by, and again put forth on our devi-

ous way. The sky was cloudy, and there was but little wind. The industrious fishermen were early at work, and from some that we met were procured portions of the arms of an enormous cuttle-fish. The cups by which he holds his prey were half an inch in diameter. Jaquith, who, on a whaling cruise, had tested the relative merits of various articles of food, eulogised this inattractive specimen as worthy of an epicurean feast. It was boiled for an hour, but to have cooked it thoroughly would have involved the expenditure of our whole supply of wood. It was too tough for us, but the flavor was that of the lobster. These fishermen had also some sea-eggs, which they detach from the rocks by a hook attached to the end of a pole.

The wind continued ahead all day, and a fog bank passed over us. At sunset it was calm. We were seven or eight miles from the land, impatiently waiting for a fair wind. During the night there was very little wind. A heavy dew fell, and the stars seemed magnificent. When the day dawned we found ourselves surrounded by fog, but a light breeze from the north-west dispersed it; then we got a fair wind from the south, to which we gave a flowing sheet. We discovered by our landmarks that instead of making several miles to the north during the night, as indicated by the log, we had been set ten miles to the southward. The temperature fell as we passed along the coast. With the southerly wind the thermometer stood at 56° F. While running merrily along before the wind, an enormous sea-lion rose on the quarter. He instantly disappeared, then came up in our wake, and struggled after us open-mouthed. His head was like that of a tiger. Owing to the inefficiency of Maynard's power, which we sometimes used, the rifle aimed at him snapped, and before a copper cap could be substituted, he was nearly out of range. By the splash of the bullet, and his sudden disappearance, we supposed that it grazed his head. At noon we lost the wind, and getting out the oars, pulled in for the land.

The choice of a course close to the shore, where we could observe every foot of the progress made by toilsome rowing, was amply repaid in the interesting and beautiful scenery displayed to our near inspection.

Lofty precipices, several hundred feet in height, formed over us. They were glowing red and yellow. Trees jutting from every crevice, and filling every ravine, relieved by their deep green hue and graceful forms. The fiery and bold character of these cliffs, which, elevated by some tremendous convulsion, were undermined by the great waves, strewing the ocean shores, even in deep water, with islet rocks. Around them the sea hissed and boiled. In one place, where a vault was formed deep in the rock, the entering wave compressed the air, and while a column of misty foam streamed out, the hill groaned and moaned as if gasping for a breath. At night we would have thought a dozen whales were struggling in the

shallows. There were columnar rocks, like ancient ruins, and in some places the strata were vertical, like so many dykes side by side; and high up beyond our reach, we saw long white mineral lines that had streamed from the precipice. At the distance of half a mile south of what we named the Red Cliff, a cascade falls into the sea.

The forest of firs and cedars that clothes the hills afford fuel to the inhabitants, who throw it from the cliffs to the strips of sandy beach that are found at intervals along the shore, whence it is taken by boats to the nearest ports.

Turning a rocky point at an oar's length, and following the curve of the shore, we found ourselves pursuing a course nearly the reverse of that made in coasting the sea-beach. On our right was a spacious bay, a village on its shore, surrounded by green and fertile fields, while a deep channel led on ahead. We followed it, until we came to a fair cove, just as the sun went down. High upon the cliffs that still overhung us, propped up, and seemingly about to fall, were perched several rude huts, but not a sign of life was visible.

The port in which we moored our boat presented new features of interest. The ruins of two cabins stood by the side of a rivulet that gushed along with gentle murmur to the shore. They had once been the abode of some Japanese family, for the garden, all over-run with weeds, still retained vestiges of cultivation, and its limits could be traced by the scattered plants, and the rank growth of encroaching weeds. The moss-rose bloomed everywhere, and over the dismembered rafters ran creeping vine, in wild profusion, and the birds springing in and out sang sweetly.

We looked about for traces of the inhabitants, for we involuntarily associated an idea of simplicity and purity with the flowers and this choice of a residence. We found hidden among rose-bushes, long unpruned, a tomb. Over it leaned a staff covered wth inscriptions, and there was lying there a bundle of flat pieces of cedar, also covered with written characters, in all probability recording the history of the family that had lived there.

However rude seamen may be, they there expressed that human pathy which is admirable in man. The spirit of the place o them. They replaced the tables which they had at first unw to feed the fire, restored the staff, and left the place of t turbed.

A crackling fire soon enlivening the glen threw a br presenting a scene worthy of a painter, who excels in b glowing rocks stood out, the water was seen to spar forms of the trees were lost in obscurity on the dark mountain, while the moving figures of the seamen life into the picture. It was late at night before the

for the crew, delighted with the romance of the adventure, were full of life and happiness. Some laid awake long, meditating upon the events of the voyage, or picturing to themselves the family that once lived where the two cabins stood, and called the cove their home.

Before dawn the fire was rekindled, and as soon as the morning meal was over we again embarked.

The evening before one of the men, once a miner of Australia, and still restless, climbed to the summit of the nearest peak, his thick Arctic boots defying the fangs of the venomous serpents, so numerous among the fragments of broken rock, and thence as darkness drew on he saw beyond the channel which we had entered, and which was narrowed by precipitous banks, a large and capacious land-locked bay, surrounded by a country smiling with fields of grain and clustered groves, with here and there a habitation.

We had seen a fishing-boat double the inland point and disappear. We burned with desire to explore its secluded waters, but inexorable time forbade. Having ascertained that up to that point the channel was deep and apparently clear, we reluctantly turned from it and pursued our course to the north.

The winds were light and baffling, wreaths of mist obscured the hill-tops, and a fog approached from the north-east. Crossing the mouth of the bay, more than a mile and a half in width, while crows and hawks wheeling above our heads fought in the air, we reached the northern point of the Bay. Scarcely were we there when the fog came on and it began to rain. To add to these disagreeable circumstances, a strong current sweeping round the point rendered the efforts of the oars unavailing. Fortunately, a port of refuge was at hand. The rocks on this part of the coast are, as before observed, broken, and there are chasms and openings sufficiently wide and deep to receive a boat, and winding enough to break the ocean swell. Rounding a low point of basalt and trap, on which perched two eagles, we entered a broad canal, bounded by high walls of rock and terminating in a pebbly beach, where a projecting shoulder of the wall-like side formed a small basin screened from the wind, though the water rose and fell several feet as the waves rolled in from the sea. The shore was bold, and we felt but little apprehension of being disturbed by the commotion without. The rocks were covered with large oysters, but they were not so good as those of our own coasts. The air was chilly and a drizzling rain fell without intermission; we congratulated ourselves on having found a resting-place for the night.

With some difficulty and at the expense of a thorough wetting, we got on shore and went up to a cluster of houses a few steps from the beach. Seeing a cloud of vapor rising from a large building thatched with straw,

we entered and there found at least a hundred Japanese, clothed in cloaks of grass and sea-weed leggings. They were crowded in this steaming enclosure to enjoy the warmth of a great furnace, surmounted by a pan containing sea-water, supplied by a conduit from the shore. It was a salt factory. The fire was fed with logs and small fir-trees. Piles of wood occupied the corners of the house, and a swarthy crew under the direction of a gaunt old woman, rolled the large logs to the door of the furnace and thence pushed them with poles to their places in the red flames. She bustled about, making room for us, occasionally diverting herself by pitch- a small tree into the fire. The crowd opened as we entered, and we dried our clothes. We propitiated the old woman and her corps of firemen by sundry trifling gifts, and they put themselves to some inconvenience to make us comfortable.

To relieve the oppressive atmosphere they ordered the crowd to disperse, and one by one the curious Japanese withdrew, leaving only some men and boys who were busily engaged in making sandals of straw, which they first rendered pliant and soft by pounding on smooth round stones. Having dried our clothes we also went out into the open air. The dwelling houses were all closed; the people seemed reserved, possibly afraid of us.

We took quiet possession of a porch protected from the rain by a jutting roof, and arranging some nets and mats as couches, we made ourselves at home. Meanwhile the sea had become so violent as to cut off communication with the boat, and the roaring of the waves drowned our voices in calling to those on board. We were compelled to wait with what patience we could for the end. Confined to this narrow ravine, with the murky sky above us, low clouds sweeping over, and the dull sound of the rain in our ears, our spirits were depressed.

It seemed as if the elements conspired to delay our arrival at Hakodadi —we imagined the ship about to sail, waiting only for us. More than the time allotted for the voyage had already passed, and unless the character of the winds and weather should change materially, there would yet be many days before our arrival. We appreciated the impatience of the crew of the Russian frigate "Diana," wrecked near Simoda, who for many months vainly attempted to leave the coast; and we wondered why we had not felt more sympathy for them. The Japanese perceiving that we could not communicate with our boat unless we would swim to her, voluntarily brought us food, the best the village afforded—meal, moistened with water, boiled acorns, rice, and fish. We were much struck with evidence of their hospitality: some fishermen happening to arrive, t fish were heaped upon the beach, and one of the Japanese divided t allotting so many to each family; when all but one of these shar been taken, they made signs that it was for us.

The fish were cooked before the furnace door, with such dexterity as showed long familiarity with the method. A split stick was passed through the gills of the fish, and by somr peculiar knack he was well fastened and still fairly exposed to the fire, then thrusting the other end of the stick over the furnace, it being inclined and the fish slowly roasted. Considerable time was required to cook them in this way, but whether owing to the excellence of the fish, our hunger, or the method of cooking them, we agreed that we had never tasted anything of the fish tribe equal to them in delicacy of flavor. While thus pleasantly engaged, one of the natives threw a large piece of sun-fish into the fire, and to our surprise we learned that it was held in esteem as an article of food.

During the afternoon several officials wearing water-proof cloaks of oiled paper arrived. They asked us no questions, but made some inquiries of the villagers with regard to us. As they were not disposed to be cordial or very polite, we returned their casual glances with an air of indifference, and they soon departed. At night the wood was removed from before the fire, and in fact the whole interior arrangements of the house were changed to make room for our accommodation. Spreading some straw mats on the earthen floor, they invited us to sleep there. We gladly availed ourselves of the offer, and with the exception of the look-out, were soon buried in profound and refreshing slumber, while the fire, gradually declining, diffused a grateful warmth.

At dawn the wind had changed, the sky was clear, only dotted by a few light and feathery clouds, the air fresh and invigorating. The birds were singing, and one would scarcely recognise the place, so completely changed was its aspect. There were many white roses and peonies in flower, and to our surprise we found the cultivated Irish potato. The plants were yet young, and not more than five or six inches in height. Tracing a rivulet, we came to a natural reservoir between its banks, and there we performed our morning ablutions in the cool and pleasant water. Shells of the haliotis were scattered about as at Sino Hama.

The fires of the furnace had burned out, and the salt packed in straw sacks, containing about a bushel each, was piled on the shore. As there were thirty or forty of these sacks they must have contained the results of several days' labor. The tide was high, and the sea still rolled into the bight preventing the approach of the launch to the shore. The Japanese with great good will launched one of their large boats and put us on board, presenting us with some salted fish as a parting gift.

Those who had slept in the launch complained much of the disagreeable night they had passed. Wet, cold, and hungry, about midnight they were compelled to haul the boat clear of the rocks against which she threatened to strike, and they had listened with forebodings to the roar of

the wind and the bellowings of the waves penetrating the caverns of the outer rock. The shore party congratulated themselves on the warm and snug berth they had enjoyed in the salt house.

Sail was made to a light air from the north. When a mile from the land we found a powerful current setting to the southward, and the sea tossed the boat about so as to shake the wind out of her sails. Recourse was had to the oars, and we pulled in shore. Cumulous clouds rapidly forming covered the whole sky with the exception of a small portion to the south-east.

The wind at last came out from that quarter, and we spread all sail; a bank rose there, while the clouds that had before covered the sky cleared away. We passed an extensive and well-cultivated table-land, then came a hilly country cultivated only in the valleys. We passed cape Kuro Saki about four o'clock in the afternoon, and two hours later were up with cape Misaki. A reef of rocks, showing detached and sharp peaks, extends half a mile from the cape to the eastward, and on them were basking a number of seals; but we were disinclined to alter the course to bring them within range. One with an immense head and apparent mane, reared up on the outer rock, and with his muzzle in the air, presented a striking appearance. The hills of this section of the coast are flat-topped and cultivated. All night we carried sail, though once or twice the stem of the boat was driven under, and the foam boiled over her forecastle.

The sun rose clearly. At intervals we brought by the wind, made observations and sounded. The last cape of the coast was in sight ahead, and a school of playful porpoises kept us company. In the bight south of this cape, (Sirija Saki) there are three villages; the land slopes down, and near the cape are sand dunes. At half-past ten on the morning of the 17th, we rounded the bluff promontory of Sirija Saki, and were entering the Straits of Tsugar. A reef of rocks was seen stretching out from the low-land beyond, and where they disappeared the water was troubled. While scanning its appearance to determine how near the rocks we might pass with safety, we saw a numerous herd of seals of various sizes, from the large one of seven or eight feet to the little one of a foot and a half in length. We were in great glee for the latter part of our run had been rapid and pleaeant. We thought to add a seal to the collection of the naturalist; so, steering to run within range of them, we intended, after firing, to luff up and clear the troubled water beyond the rocks in which they were basking. Under all sail, right before the wind, going sev[illegible] knots, we neared them. Every eye was fixed on our expected prey, [illegible] suddenly we discovered that the troubled water indicated a ledge of b[illegible] rocks, over which it swept like a mill race. Though scarcely with[illegible] the gun was fired. The seals, stung by the spent shot, bounded like b[illegible]

into the water; but from them the interest was instantly transferred to ourselves. Luffing to and lowering the square-sail, we hauled aft the main-sheet; the boat keeling to the fresh wind, sprung like an arrow on her course. It was too late; the current was sweeping us broadside on to the reef, and its extremity was too distant to be reached before we would be among the rocks The further we went the greater became the commotion of the angry waters. All comprehended the danger. The simple remark, "She wont fetch," conveyed volumes. There was one chance remaining, and we struck for it.

"Hard up the helm and let her go through!" The main-boom swung broadly off, the boat rose on a swell, gathered way, and with the combined speed of the current and that given by her sails, dashed right in among the boiling eddies. "Starboard! port! steady!" were the only words uttered, as rock after rock was seen in the depths below, each the center of a circling eddy. As she rose and settled on the heavy swell, we expected every moment to feel the crash, and involuntarily every form rose as if to relieve the weight within her. "She will go through sir," said an old seaman, as he at last saw the water darken; and so she did. One long-drawn breath testified the relief from that terrible interval of suspense. To strike one of those rocks was almost certain destruction. The swiftly running current would instantly have swept every soul out into the broad ocean. No human eye would have witnessed the catastrophe; a straggling oar or a water-cask, might long after have shed a single ray of light on the fate from which the Providence of God preserved us.

The broad straits of Tsugar laid between us and our destined port. The fair wind blew freshly, and the water flashed under the bows. At the very entrance of the straits, the land sweeps in, forming a deep light or bay, with sandy shores. Sharp-peaked mountains define its western limit. Grazing on the grassy slopes of the lowlands, were numerous cattle; but the uncultivated character of the country surprised us. Within the straits, on this southern shore, we saw no villages—scarcely a house.

The highland of Jezo was in sight on our starboard bow, becoming more distinct as we left the southern shore. The burning mountain on Jezo, deeply scarred, surmounted by a cloud of burning vapor, presented glowing colors, russet brown, and red mingled with gray and blue. The northern shore is high and mountainous. The bearings of the land changed very slowly, and we inferred that the current was adverse. A line of white and foaming water indicated the meeting of two currents, differing in direction, and we ran for it. It was a tide up. For a moment, skirting its border, to study the chances of passing through, we edged away and entered. The sea was after us, yet the water seemed running from under the boat, so swiftly did it glide away. Between the waves it was like a

sea of sliding glass. Its motion made one giddy. This great velocity must have been limited to the depth of four or five inches, which would explain an apparent speed double the reality.

The crests of the waves came in over the taffrail, and the bows dipped, but we persevered, and once more entering smooth water, seemed to fly by the land. A favorable current had been struck. A great hill at the north shore, smooth, without a single tree, covered with grass from top to bottom, as green as the hills of New England in spring, marks the beginning of the low sweeping shore, which forms a hollow bend in the land, and extends to the port of Hakodadi. In various coves and indentations of the high land we passed were hamlets, composed of four or five houses. Rocks jutting from the water in spires and rugged knobs dotted the shore line.

At length the keen eyes of the seamen discovered the faint outlines of a ship's spars far off. "Sail ho!" they cried. It was the Vincennes. The low land, which, like the neutral ground of Gibraltar, forms one side of the harbor, was below the horizon, and the ship appeared to be anchored in the straits. We soon discovered the low land, and bore up for the great blue rock, which again like the rock of Gibraltar, terminates the low sandy peninsula. We could distinguish the masts of several vessels, besides the Vincennes, recognising the steamer John Hancock and the schooner Fennimore Cooper. The sun set, we were near the end of our journey, yet we experienced an emotion of regret that our adventures were over, and it was even proposed that we should anchor and spend one more night comfortably in the boat, such is the character of seamen. A lantern was hoisted to the mast-head, to indicate our approach. When we reached the high bluff it was dark, and to avoid the fitful winds that eddy round such promontories, sail was shortened, and well was it, for several whirling gusts followed each other in quick succession. The sails were furled, and for the last time the oars were manned. We had pulled but a short distance when several distinct and heavy jars announced that we were among rocks. We sheered out from the shore, but only to become entangled among them. Carefully sounding round with the oars, we succeeded, by backing, shoving ahead, and winding, in clearing them; but we spent one hour there. We then came to a junk at anchor. A lantern gleamed at her side. We disharged a heavily-loaded gun as a signal to the ship. Quick as the flash the lantern disappeared. The lights of the ship were seen, and we ran for them. As the heavy sweep of the oars was heard, the quarter-master recognised them, and quickly hailed. As the answer went, we heard the sound of many feet, and the words "the launch! the launch has come!"

THE LAKE TRADE.

The agricultural and commercial wealth of these inland seas, or the States bordering upon them, is seldom well considered by those of the eastern sea-board of our country. Nautical commerce is one of the best exponents of the agricultural and mineral wealth of any country, and when applied statistically to the late trade, shows a larger amount than can be found elsewhere on the globe. The increase for the past quarter of a century has been over 40 per cent. per annum, and this, too, despite the commercial and monetary prostrations which, commencing in 1837, extended their paralysing effects over the entire country. The commerce of the lakes has made giant strides over all financial difficulties, consequent upon the great agricultural wealth of those States to which the lakes act as highways.

The amount of grain alone which was carried over these waters during the season of 1851, amounted to 1,962,729 barrels of Flour, and 8,119,169 bushels of Wheat, amounting to what equals an aggregate of 17,932,807 bushels of Wheat; 7,498,264 bushels of Corn; 1,591,758 bushels of Oats; and 360,172 bushels of Barley:—in all, 27,382,801 bushels of cereal products.

During the past fifteen years, the total trade upon the Lakes has increased with a rapidity almost beyond belief. From $65,000,000 in 1841 it has swelled to $608,310,320 in 1856. The whole of this grand aggregate of trade and wealth, with the exception of $42,260,000 set down for Sackett's Harbor, Cape Vincent, Oswegatchie, Genesee and Niagara, came through the following ports, and in the proportion stated:—Buffalo, $503, 023,000; Chicago, $223,898,000; Cleveland, $162,185,630; Detroit, $140, 000,000; Milwaukie, $35,000,000; Maumee, $94,107,000; Sandusky, $59, 996,000; and Oswego, $146,335,000. The tonnage of the Lakes now amounts to 45,126 tons, which is one twelfth of the total tonnage owned by the United States, and about one-fifth of the total tonnage employed in the coasting trade.

We are not of the number of those who believe that the commercial wants and trade of this vast region of country can be supplied by rail-roads, even though new lines and tracks were made. It is not in the economy of nature or science that they should; they can be but auxiliaries at most. Nature has herself determined the great thoroughfares of commerce. She admits, free of charge, cars of every size. Her cars stop at the door of every important town or city, her track is adapted to every guage, and if the car should occasionally get off the track, they are again restored without danger or cost. Nature's own element and mode of conveyance has

made the lake trade what it is, and what it will be, and not railroads, although useful auxiliaries. For the same reasons we cannot agree with the Chicago speculator, whether sane or otherwise, who recently remarked that Chicago would soon be the great *entrepot* of the world. New-York, he allowed, would always be a commercial town of some importance, but all the world must pay tribute to Chicago. We hope this man's friends will not allow him to go at large—lest he should become dangerous. He carries a map of Chicago in his pocket.

ON THE HIRE, PAYMENT, AND TREATMENT OF SEAMEN.

The abuses of seamen are multiplying on every hand. Marine officers are acquiring a reputation for brutal conduct which is disgraceful to the age. Shipmasters are suffering all manner of annoyance and disgrace in foreign lands, not only from the depravity of *sharks* and vagabond sailors, but even from the authorities. The efficient manning of our ships is becoming almost impossible in many foreign ports. The safety of life and property is likely to become more precarious every year, unless a remedy be found, and vigorously applied.

The American shipmasters in Liverpool have held a meeting to refute certain misrepresentations of the British press, and to consider remedies for many serious abuses practiced under the present system of shipping and paying seamen. We are pleased to note this step towards reform, and only regret that similar meetings have not yet been held in our own ports. We hope they will be, however, and result in moving Congress to a consideration of the subject. Spirited and enlightened resolutions were adopted at the meeting referred to, and the infamous practices of Liverpool landlords, in shipping every kind of article, except sailors, for crews of American ships, are fully shown up. The present system of hiring seamen through the agency of shipping-offices, and paying wages in advance, has worked out all the robberies and extortion between the shipping-master and landlord—of putting sailors on board intoxicated, and without clothing or equipment, and passing off tinkers, barbers, and desperadoes, for seamen.

The meeting recommended a treaty of reciprocity between H. B. Majesty's government and the United States, providing that crews for American ships may be shipped through a regularly appointed agent, or by the masters themselves. The establishment of such a treaty was to be absolutely necessary to protect the extensive commercial i tween the two countries.

In reference to the subject of reform in the United States, the Captains remark as follows:—

"Whilst praying for the abolishment of the abuses which have crept into the system of enlistment in Liverpool and other British ports, we must not forget that in our own country we have abuses equally as bad. We all know that our own shipping-masters are without power or authority, and that being so, they are entirely at the mercy of the landlords, who not only rob the sailor of his advance and wages, but compel the ship to pay—we blush to name the word—blood money. We would urge our employers to form Ship-owners' Societies, that they may examine into the existing abuses, and bind ourselves to inform them of such as may come under our notice, that, as a body of men of weight and respectability, they may so represent them to our government that a system of marine laws shall be enacted that will sufficiently protect their interests, as also the seamen who sail in their ships. We would particularly recommend them to have our shipping-agents government-officers, chosen among men of character and standing, and without regard to political opinion. That they should be acquainted with nautical affairs, and capable of judging the capacity of any mho might apply to them for employment. That they should be clothed with such powers that they may be responsible to the government alone. We would also suggest te the underwriters the immense detriment of their interests through the ruinous system now existing, of advances; for it is a well-known fact that hundreds of ships have been abandoned for the very reason that the sailor, having received all he expects to get before the commencement of the voyage, and consequently having no personal interest at stake, will make no exertion to save property which is to be to him of no future benefit. We would therefore recommend that the system of advances should be entirely abolished, by inserting a clause in the policy that any ship which pays advance wages shall, if lost, forfeit her insurance. This would, in our humble opinion, prove an immense moral benefit to the seaman; for, having no advance to look forward to, they would naturally provide themselves with necessary clothing for the next voyage. We would also humbly beg to suggest that the government of the United States should pass a law that any seaman brought on board in a state of intoxication, his landlord should be held liable in a fine of not less than equal to one month's wages, the certificate of captain and pilot being sufficient authority. We would humbly represent to the government of the United States that this last is one of the greatest causes of disturbances on ship-board, and that many ships have been lost by leaving port with a drunken crew on board."

These conclusions are to the point, and quite correct in assigning the responsibility of a movement for reform upon the shoulders of ship-owners. If they are not to be held accountable for the control and management of their own property and business, then all hope of better things may as well be abandoned in despair. Besides their own efforts to break up the present destructive and disreputable system of enlisting, paying, and treating sailors, owners may call to their aid the underwriters, and thus make the work sure and thorough.

Meanwhile the work of reform may be commenced. Let twelve or twenty of the most resolute and substantial shipping-houses in our large seaports combine to introduce the new system—say on the following plan: Let the master and mate ship the crew, they signing the articles on board. Let the wages be raised, if necessary, to induce seamen of ability and character to come forward. Not one dollar should be paid in *advance*; if clothing is needed, let it be furnished by the ship, to be charged in account, and let it be understood that suitable clothing for the voyage must be provided to each man. If seamen have families to maintain ashore, let any portion of the pay be set apart for that purpose, by agreement; and finally, let it be understood that meritorious seamanship and good conduct will be encouraged by the officers and owners of the ship, and that a prompt discharge will await those who disgrace the mariner's calling, and the society of all decent and respectable men.

Under such a system as this, it will happen that the vicious, degraded, and good-for-nothing sailor will stand by the old system, robbed and bamboozled by the *sharks* ashore, and knocked and cuffed by bullies on board ship at sea. Birds of a feather will then have some fair play in flocking together—now the evil is that they are so confusedly *mixed*, no man will remain a seaman if he can avoid it. The better class of sailors, being no longer shipped like bales of cotton, and pressed into stowage after a like fashion, and being released from the power of landlords, the characteristics of manhood will once more appear in the conduct of seamen, and the profession become redeemed from that deteriorated standard to which it has of late years become reduced in American ships, from the employment of incompetent and vicious foreigners. The only motives now placed before good men on ship-board are to rise to places of authority, and to leave the service. Opportunity decides between those.

Some of the principles involved in these remarks are applicable to the officers of ships. The disgraceful scenes of violence which have occurr on ship-board, of late, are calculated to ruin the character of the ship ar good sailors, so long as the offending party shall remain Resolution and energy are poor pleas in extenuation

fanity, and inhumanity of conduct towards sailors. No man is worthy of an owner's confidence who is guilty of abusing his fellow-man. We would not trust such a man—no not with sixpence, much less with life and property.

THE MARINE ALGÆ.

BY WILLIAM HENRY HARVEY.

Among the plants which constitute the ordinary covering of the ground, whether that covering be one of forests, peopled by vegetable giants, or of the herbage and small herbaceous plants that clothe the open country, we observe that the greater number—at least of those which ordinarily force themselves on our notice—have certain obvious organs or parts, namely, a *root*, by which they are fixed in the ground, and through which they derive their nourishment from the fluids of the soil; a *stem*, or axis, developed, in ordinary cases, above the ground; *leaves*, which clothe that stem, and in which the crude food absorbed by the roots, and transmitted through the stem, is exposed to the influence of solar light and of the air; and finally, special modifications of leaf-buds called *flowers*, in which seeds are originated and brought to maturity. These seeds, falling from the parent plant, endowed with an independent life, under whose influence they germinate, attract food from surrounding mineral matter, digest it, *organize* it—that is, convert it from dead substance into living substance—form new parts or organs from this prepared matter, and finally, grow into vegetables, having parts similar to these of the parent plant, and similarly arranged.

This is the usual course of vegetation. Seeds develop roots, stems, and leafy branches. The latter, at maturity, bear flowers, producing similar seeds, destined to go through a like course; and so on, from one vegetable generation to another. But with a perfect agreement among seed-bearing plants in the end proposed and attained, there is an endless variety of minor modifications through which the end is compassed. All degrees of modification exist between the simplest and most complicated digestive organs; in some the root, stem, and leaves are so blended together that we lose the notion of distinct organs, and in others the leaves are reduced to scales or spines, while the stem and branches are expanded, and become not merely leaf-like, but actually discharge the functions of leaves. In the reproductive organs, or flowers, too, we find equal variety, from the most elaborate, and often gorgeous structures, to the simplest and plainest, till at last we arrive at flowers, whose organization is so low that not only

have calyx and corolla disappeared, but the very seed-vessel itself is reduced to an open scale, or is wholly absent. Yet in all these modifications it is merely the means that are varied; the end proposed is as efficiently attained by the simplest agency as by the most complex; as if the Creator had designed to show us plainly how it is the same to Him to act by many or by few, by the most elaborate arrangement, when he wills it, and by the simplest, when that is his pleasure.

In all the cases of which we have as yet spoken, *seeds* are the result of the vegetable cycle; a seed being a compound body, containing an *embryo*, or miniature plant, having stem, root, and leaf, already organized, and enclosed with proper coverings, or seed coats. But some plants do not produce such seeds. At least one-sixth of the vegetable kingdom, perhaps more, are propagated by isolated cells (or *spores*,) cast loose from the structure of which they had formed a portion, and endowed thenceforth with independent powers of growth and development. Such are the reproductive bodies of the ferns, the mosses, and all plants below them in the vegetable scale, concluding with the large class to which our attention will now be confined—the Algæ, which, of all, are the lowest and simplest in organization.

The framework of every vegetable is built up of *cells*, little membranous sacks of various forms, with walls of varying tenacity, empty or containing fluid or granular, organized matter, from which new cells may be developed. Among more perfect plants there is, in different parts of the same individual, considerable variety in the form and substance of the cells; those of the wood and of the veins of the leaves being different from those of the soft part of the leaves, and these again different from those of the skin which is spread over the the whole. But as we descend in the scale of organization, greater and greater uniformity is found. Below the *ferns*, no vascular tissue and no proper wood-cells occur; and at last in the Algæ no cells exist differing from those of ordinary parenchyma, or soft cells, such as compose the pulp of a leaf. Algæ, then, together with mosses, lichens, and fungi, are termed *cellular* plants, in contradistinction to ferns and flowering plants, which are denominated *vascular*. Among the most perfect of the Algae, however, though the cells are all of the same substance and nature, all *parenchimatic*, they are of various forms and arrangement in different portions of the vegetable, often keeping up a very perfect analogy with the double system of arrangement—the vertical and horizontal, or woody and cellular system—of higher plants. Thus the cells of the axis of the compound cylindrical Algæ are arranged longitudinally, like the wood-cells of stems, while those of the periphery or outer coating of the same Algæ have a horizontal direction.

In the most perfect of such Algæ the frame still consists of *root*, *stem*,

and *leaves*, developed in an order analogous to that of higher plants. Passing from such, we meet with others gradually less and less perfect, until the whole vegetable is reduced either to a root-like body, or a branching naked stem, or an expanded leaf; as if Nature had first formed the types of the compound vegetable organs so named, and exhibited them as separate vegetables; and then, by combining them in a single framework, had built up her perfect idea of a fully organized plant. But among the Algæ we may go still lower in vegetable organization, and arrive at plants where the whole body is composed of a few cells strung together, and finally, at others, the simplest of known vegetables, whose framework is a single *cell*. These are the true vegetable *monads*. With these we commence the great series of the Algæ at its lowest point, and proceeding upwards, we find, within the limits of this same series, all degrees of complication of framework, short of the development of proper flowers. It is this progressive organization of the Algæ which renders the study of this portion of the vegetable world especially interesting to the philosophical botanist, because it displays to him, as in a mirror, something of that general plan of development which nature has followed in constructing other and more compound plants, in which her steps are less easily traced. From its first conception within the ovule, to its full development, one of the higher plants goes through transformations strictly analogous to stages of advancement that can be traced among the Algæ from species to species, and from genus to genus, from the least perfect to the most perfect of the group. Each Alga-species has its own peculiar phase of development, which it reaches, and there stops; another species, passing this condition, carries the ideal plan a step further, and thus successive species exhibit successive stages of advancement.

While their gradually advancing scale of development renders the study of these plants more interesting, it also increases the difficulty of constructing a short and yet definite character, or *diagnosis*, which will exclude every member of the group, and exclude species more properly referable to the kindred groups of lichens and fungi. I shall not here attempt any such critical definition, but proceed to trace the gradual evolution of the frond and of the organs of fructification in the Algæ, assuming that with the Algæ are to be classed all thallophytes, (or Cryptogamic plants destitute of proper axes, in the more restricted view of that term,) which are developed in water, or nourished wholly through the medium of fluids, while all thallophytes that are ærial, and not parasitic, are lichens, and all that are ærial and parasitic are fungi.

Commencing, then, with Algæ of the simplest structure, a large part of them, belonging to the orders *Diatomaceae* and *Desmidiaceae*, consist almost entirely of individual isolated cells. Each plant, or frond, is formed

of a single living cell; destitute, therefore, of any special organs, and performing every function of life in that one universal organ of which its frame consists. The growth of these simple plants is like that of the ordinary cells of which the compound frame of higher plants is composed. Nourishment is absorbed through the membranous coating of the young plant (or cell,) digested within its simple cavity, and the assimilated matter applied to the extension of the cell-wall, until that has reached the size proper to the species. Then the matter contained within the cavity gradually separates into two portions, and at the same time a cell-wall is formed between each portion, and thus the original simple cell becomes two cells. These no longer cohere together, as cells do in a compound plant, but each half-cell separates from its fellow, and commencing an independent career, digests food, increases in size, divides at maturity, &c., going again and again through a similar round of changes. In this way, by the process of self-division, and without any fructification, a large surface of water may soon be covered with these vegetable monads, from the mere multiplication of a single individual.

These minute plants, (*Diatomaceae* and *Desmidiaceae*) from their microscopic size and uniform and simple structure, are justly regarded as at the base of the vegetable kingdom. Notwithstanding which lowly position in the scale of being, they display an infinite variety of the most exquisite forms and finely-sculptured surfaces; so that their study affords as much scope for the powers of observation as does that of the creation which is patent to our ordinary senses. These tribes are, however, omitted from this essay, because they have been made the objects of special inquiry by Professor Bailey, of West Point, whose memoirs in the volumes of the Smithsonian Contributions are referred to for further information.

But *Desmidaceae* and *Diatomaceae* are not the only Algæ of this simple structure. The lowest forms of the order *Palmellaceae*, such as the *Protococcus*, or *red Snow-plant*, have an equally simple organization. The blood red color of Alpine or Arctic snow which has been so often observed by voyagers, and which was seen to spread over so vast an extent of ground by Captain Ross, in his first Arctic journey, is due to more than one species of microscopic plant, and to some minute infusorial animals which perhaps acquire the red color from feeding on the *Protococcus* among which they are found. The best known and most abundant plant of this snow vegetation is the *Protococcus nivalis*, which is a spherical cell containing a carmine-red globe of granulated, semi-fluid substance, surrounded by a hyaline limbus, or thick cell-wall. At maturity the contained red matter separates into several spherical portions, each of which becomes clothed with a membranous coat, and thus forming as many small cells. The walls of the parent, whose living substance has thus been appro-

priated to the offspring, now burst asunder, and the progeny escape. These rapidly increase in size, until each acquires the dimensions of the parent, when the contained matter is again separated into new spheres; giving rise to new cells, to undergo in their turn the same changes. And as, under favorable circumstances, but a few hours are required for this simple growth and development, the production of the red snow plant is often very rapid; hence the accounts frequently given of the sudden appearance of a red color in the snow, over a wide space, which appearance is ascribed, by common report, to the falling of bloody rain or snow. In many such cases it is probable that the *Protococcus* may have existed on the portion of soil over which the snow fell, and its development may have merely kept pace with the gradually deepening sheet of snow. That this plant is not confined to the surface of snow is well-known; and Captain Ross mentions that in many places where he had an opportunity of examining it, he found that it extended several feet in depth. It has been found both in Sweden and Scotland, on rocks, in places remote from snow deposits; and it probably lies dormant, or slowly vegetates, in such cases, waiting for a supply of snow, in which it grows with greater rapidity.

The structure and development which I have described as characterising *Protococcus*, are strikingly similar to those of what are commonly considered minute infusorial animals, called *Volvox;* the chief difference between *Protococcus* and *Volvox* being that the latter is clothed with vibratile hairs, by the rapid motion of which the little spheres are driven in varying directions through the water. Many naturalists, and some of high note, are now of opinion that *Volvox* and its kindred should be classed with the Algæ, and certainly (as we shall afterwards see) their peculiar ciliary motion is no bar to this association. I do not pronounce on this question, because it does not immediately concern our present subject, and because, in all its collateral bearings, it requires more attentive examination than it has yet undergone.

In *Protococcus* the cell of which the plant consists is spherical or oval; in other equally elementary Algæ the cell is cylindrical, and sometimes lengthened considerably into a thread-like body. Such is the formation of *Oscillatoriae.* In *Vaucheriae* there is a further advance, the filiform cell becoming branched without any interruption to its cavity; and such branching cells frequently attain some inches in length, and a diameter of half a line, constituting some of the largest cells known among plants.

In all these cases each cell is a separate individual: such plants are therefore the simplest expression of the vegetable idea. But even in this extremest simplicity we find the first indication of the structure which is to be afterwards evolved. Thus in the spherical cell we have the earliest type of the cellular system of a compound plant developing equally in all

directions; and in the cylindrical cell the illustration of the vertical system developing longitudinally. These tendencies, here scarcely manifest, become at once obvious when the framework begins to be composed of more cells than one.

Thus in the genera nearest allied to *Protococcus*, the frond is a roundish mass of cells, cohering irregularly by their cells. From these, through *Palmella Tetraspora*, we arrive at *Ulva*, where a more or less compact membranous expansion is formed by the lateral cohesion of a multitude of roundish (or, by mutual pressure, polygonal) cells originating in the quadri-partition of older cells; that is, by the original cells dividing longitudinally as well as transversely, thus forming four new cells from the matter of the old cell, and causing the cell-growth to proceed nearly equally in both directions. Starting, therefore, from *Protococcus*, and tracing the development through various stages, we arrive in *Ulva*, at the earliest type of an expanded leaf.

In like manner the earliest type of a stem may be found by tracing the Algæ which originate in cylindrical cells. Here the new cells are formed in a longitudinal direction only, by the bipartition of the old cells. Thus, in *Conferva*, where the body consists of a number of cylindrical cells, strung end to end, these have originated by the continual transverse division of an original cylindrical cell. Such a frond will continually lengthen, but will make no lateral growth; and consisting of a series of joints and interspaces, it correctly symbolizes the stem of one of the higher plants, formed of a succession of nodes and internodes. And the analogy is still further preserved when such confervoid threads branch; for the branches constantly originate at the joints, or *nodes*, just as do the leaves and branches of the higher compound plants.

We have then two tendencies exhibited among Algæ—the first a tendency to form membranous expansions, the symbols or types of leaves; the second, a tendency to form cylindrical bodies, or stems. Among the less perfect Algæ, the whole plant will consist either of one of these foliations, or of a simple or branched stem. But gradually both ideas or forms will be associated in the same individual, and exhibited in greater or less perfection. We shall find stems becoming flattened at their summits into leaves, and leaves, by the loss of their lateral membranes, and the acquisition of thicker midribs, changing into stems; and among the most highly organized Algæ we shall find leaf-like lateral branches assuming the form, and to a good degree the arrangement of the leaves of higher plants. Not that we find among Algæ proper leaves, like those of phænogamous plants, constanfly developing buds in their axils; for even where leaf-like bodies are most obvious, as in the genus *Sargassum*, they are merely *Phyllocladia*, or expanded branches, as may readily be seen by observing

a *Sargassum* in a young state, and watching the gradual changes that take place as the frond lengthens. These changes will be explained in the systematic portion of my work.

I shall now notice more particularly the varieties of habit observed among the compound Algæ; and first,

OF THE ROOT.

The *root* among the Algæ is rarely much developed. Among higher plants which derive their nourishment from the soil in which they grow, and in Fungi which feed on the juices of organized bodies, root-fibres, through which nourishment is absorbed, are essential to the development of the vegetable. But the Algae do not, in a general way, derive nourishment from the soil on which they grow. We find them growing indifferently on various mineralogical character, on floating timber, on shells, on iron or other metal, on each other—in fine, on any substance which is long submerged, and which affords a foothold. Into none of those substances do they emit root, nor do we find that they cause the decay, or appropriate to themselves the constituents of those substances. They are nourished by the water that surrounds them, and the various substances which are dissolved in it. On those substances they frequently exert a very remarkable power, effecting chemical changes which the chemist can imitate only by the agency of the most powerful apparatus. They actually sometimes reverse the order of chemical affinity, driving out the stronger acid from the salts which they imbibe, and causing a weaker acid to unite with the base. Thus they decompose the muriate of soda which they absorb from sea-water, partly freeing and partly appropriating the chlorine and hydrogen; and the soda is found combined in their tissues with carbonic acid.

A remarkable instance of the action of a minute Alga on a chemical solution was pointed out to me by Prof. Bache, as occurring in the vessels of sulphate of copper kept in the electrotyping department of the Coast Survey office at Washington. A slender confervoid Alga infests the vats containing sulphate of copper, and proves very destructive. It decomposes the salt, and assimulates the sulphuric acid, rejecting (as indigestible!) the copper, which is deposited round its threads in a metallic form. It sometimes appears in great quantities, and is very troublesome; but the vats had been cleaned a few days before I visited them, so that I lost the opportunity of examining more minutely this curious little plant. Most probably it is a species of *Hygrocrocis*, a group of Algæ of low organization but strong digestive powers, developed in various chemical solutions or in the waters of mineral springs. All the Algæ, however, which are

found in such localities, are not species of *Hygrocrocis*, for several *Oscillatoriae* and *Colothrices* occur in thermal waters. Species of the former genus are found even in the boiling waters of the Icelandic Geysers. Of the latter, one species at least, *Calothrix nivea*, is very common in hot sulphur springs, and I observed it in great plenty in the streams running from the inflammable springs at Niagara.

But on whatever substance the Alga may feed, it is rarely obtained through the intervention of a root. Dissolved in the water that bathes the whole frond, the food is imbibed equally through all the cells of the surface, and passes from cell to cell towards those parts that are more actively assimilating, or growing more rapidly. The *root*, where such an organ exists, is a mere holdfast, intended to keep the plant fixed to a base, and prevent its being driven about by the action of the waves. It is ordinarily a simple disc, or conical expansion of the base of the stem, strongly applied and firmly adhering to the substance on which the Alga grows. This is the usual form among all the smaller growing kinds. Where, however, as in the gigantic Oar-weeds or *Laminariae*, the frond attains a large size, offering a proportionate resistance to the waves, the central disc is strengthened by lateral holdfasts or discs formed at the bases of side roots emitted by the lower part of the stem; just as the tropical Screw-pine (*Pandanus*) puts out cables and shrouds to enable its slender stem to support the weight of the growing head of branches. The branching roots of the *Laminaria*, then, are merely *Fucus*-discs become compound: instead of the conical base of a *Fucus*, formed of a single disc, there is a conical base formed of a number of such discs disposed in a circle. In some few instances, as in *Macrocystis*, the grasping fibres of the root develop more extensively, and form a matted stratum of considerable extent, from which many stems spring up. This is a further modification of the same idea, a further extension of the base of the cone.

In all these cases the roots extend over flat surfaces, to which they adhere by a series of discs. They show no tendency to penetrate like the branching roots of perfect plants. The only instances of such penetrating roots among the Algæ with which I am acquainted, occur in certain genera of *Siphoneae* and in the *Caulerpeae*, tropical and subtropical forms, of which there are numerous examples on the shores of the Florida Keys. These plants grow either on sandy shores or among coral, into which their widely extended fibrous roots often penetrate for a considerable distance, branching in all directions, and forming a compact cushion the sand, reminding one strongly of the much divided roots of grasses that bind together the loose sands of our dunes. B these cases do the roots appear to differ from the nature and their ramification and extension through the sand is

to the unstable nature of such a soil. It is not in search of nourishment, but in search of stability, that the fibres of their roots are put forth, like so many tendrils. We shall have more to speak of these roots in the proper place.

(To be continued.)

HOW THE RAINBOW WAS MASTED.

In this fast age, we scarcely find time to recount, or even notice the points of interest in the days of yore The motto is Excelsior, regardless of the the past, (and too often of the future,) the present, chiefly encompassing our thoughts. There are a few, however, who are short-winded, and pause in the race to take breath. While they thus rest by the wayside, we will endeavor to interest them with a preface leaf from the history of clipper-ships. It may be remembered by a few, that the *Rainbow* was the pioneer of clipper-ships in the United States, before the Californias had been found to be productive in the precious metals. The Canton traders, since the close of the past century, have sought such vessels for their trade as would not only carry an amount of cargo above the registered tonnage, but at the same time show good returns from their sailing qualities. There seemed to be not only a determination to have a fair proportion of carrying qnalities in the ships of the Canton trade, as compared with other vessels, but a constant inkling after short voyages. As the present century approximated its meridian, there were found to be several competitors in the tea trade, in New-York as well as elsewhere—a John Jacob Astor, or a Thomas H. Smith, no longer were able to frown down rivals. There seemed to be a disposition to date a new era in commerce, and as the tea-trade became distinguished at Boston during the war of the revolution, it was deemed equally proper, to distinguish this particular trade, in this war of rival interests.

Such was the *Young American* type of feeling and determination when this war of competition in clipper-ships broke out in New-York, first confined to the Canton trade, between the Aspinwalls and Russels, and subsequently to the Californias. The *Rainbow* being a departure from all former usage, both in proportions and model, was set down as a bold movement for Mr. Aspinwall to make. The vessel was built by Smith & Dimon, ship-builders of note, and although Mr. Aspinwall had great confidence in their judgment and experience, yet there were some points that should, as he thought, be determined in other quarters. Mr. A. had come to the very just conclusion that the masting of ships was not a question of small moment in ship-building, and had determined that his ship

should have the benefit of foreign aid in locating the masts. Accordingly he informs the builders that he would obtain assistance, for their benefit as well as his own, in this department. The builders, of course, paid but little attention to this information. Having contracted to build the ship, they felt quite competent, as well as determined to do so. Captain C—— who was appointed to superintend her construction, was directed by Mr. Aspinwall to select the best authorities in Europe, on masting ships; and having done so, the parties were written to in reference to this weighty matter, and aid invoked, when, after considering the principal dimensions of the vessel, the trade, and certain other formulas of no consequence to name, much less to compute, the decision was made, and forwarded with as much care as if it were an invoice of a cargo of tea, instead of an invoice of certain *rules of thumb on masting*. While England and France were thus solving the important problem, the ship was steadily progressing at New-York. The clamps being ready, the beams were placed according to the usual mode, in conformity with the deck plan, and the framing of the decks proceeded in the usual manner; hatches were framed, partners were framed, the knees took their usual place, fore and aft ledges and carlins were arranged to conform to the deck plan, the waterways, deck, and plankshears secured their share of attention, in due time, the ship was planked and being caulked, the deck was being laid, and the channels and mast-steps securing the usual amount of labor; the spars were also made, when the important dispatches arrived. They were examined by Capt. C., and Mr. A. was informed that they were all right, when Capt. C. was directed to give the information to Messrs. Smith & Dimon, which, of course, was done. The ship was finished without alteration, and placed under the command of Capt. Hays, and performed several very successful and remarkably short voyages, which led Capt. H. to announce it as his belief that she could not be surpassed, though another ship, the famous *Sea Witch*, was then building for that specific purpose. We may remark that the success of the *Rainbow* was attributed, by the owner, superintendent, and master, *to the stationing of her masts by foreign rules*, nor have they yet been undeceived. Even the superintendent, who was on deck almost every day, did not know that the stations of the masts had been fixed, and were immovable, long before his budget of *rules of thumb* arrived; and although the *Rainbow* has long since been lost, with her enterprising master, it is confidently believed that her good qualities consisted chiefly in the stationing of her masts by foreign aid. We have seen a letter from Captain C. to that effect, of comparatively recent date.

THE NAVY DEPARTMENT.

In the origen of our navy, Oct. 13th, 1775, a "*Marine Committee*," composed of three members of Congress, Messrs. John Adams, John Langdon and Silas Dean, (the place of Mr. Adams was afterward filled by Mr. Gadsden,) had the direction of the Navy Department. The "Marine Committee" was subsequently increased to thirteen, one from each colony, and in 1776, a "*Continental Naval Board*," consisting of three members, subordinate to the "Marine Committee," was added to the administrative force of the department. This arrangement was supplanted by the "*Board of Admiralty*," appointed 28th October, 1779. It consisted of five Commissioners, two of whom were chosen from members of Congress, and three at large, any three of whom formed a quorum for the despatch of business, but in all cases subject to the approval of Congress.

Feb. 7th, 1781, Major General Alexander McDougall was appointed *Secretary of Marine*, and on this office was devolved the direction of the Navy Department,—but in the same year an *Agent of Marine* was appointed; he had the direction of fitting out, equiping and employing the ships and vessels belonging to the navy, and the charge of all the accounts, expenses, demands and settlements;—these duties were afterwards placed under the *Superintendent of Finances*, the celebrated Robert Morris.

Aug. 7th, 1789, all the naval affairs were placed under the direction of the Secretary of War. His administration continued until the *origin of Navy Department, April 30th*, 1798, to which a chief officer was appointed, called the *Secretary of the Navy*.

The business of this officer was soon found to be too diversified and to embrace too many objects, for the superintendence of any one person, and special Boards for the supervision of the details of duty were deemed an early requisite of the Department. An organization which required the chief of it, not only to have the direction of, but to be conversant with all the details of a system of multifarious subjects, would necessarily divert his attention from the prime object of the office—the proper disposition of the navy for the best interest of the nation. The making of estimates, contracts, purchases, surveys and the like were at total variance with the administrative affairs and the qualities essential to their proper discharge.

The nature, construction and equipment of the ships which constitute a navy, were then as they are now, the only true basis of efficiency, durability and economy, and the most important branch in the administration of its affairs. And with a view to the utility of a navy, these objects should command such attention as will promise the best results. As well may we expect an efficient navy to be constituted out of the heterogenious hulks of

all ages, as to suppose any one man's mind equal to such discordant excellencies.

Feb. 7th, 1815, a "*Board of Commissioners*," consisting of three Captains in the Navy, was attached to the office of the Secretary, in order to discharge the ministerial duties—"the procurement of naval stores and materials, construction, armament, equipment and employment of vessels of war, as well as other matters connected with the naval establishment," &c. The appointment of this Board accomplished something towards systematic duty, but three persons of the same avocation and proclivities were not qualified to accomplish the end sought in their appointment. The duty of naval officers proper, is but one of the essentials necessary to an efficient navy; this the Commissioners may be supposed to have perfectly understood. To judge of and contract for, *all* things necessary for the armament, equipment and provisioning of ships and to superintend their construction and repair; and to do all this in the cheapest and best manner, requires such knowledge as Captains in the Navy could make no pretensions to; therefore it was not surprising that in the end they proved unequal to the task.

In the place of the Board of Commissioners, a law of Aug. 31st, 1842, established the Bureau System which now continues.

1. A Bureau of Yards and Docks.
2. A Bureau of Construction, Equipment and Repair.
3. A Bureau of Provision and Clothing.
4. A Bureau of Ordnance and Hydrography.
5. A Bureau of Medicine and Surgery.

For the Chiefs of these, the law specified that Captains in the navy should be appointed to the 1st and 4th. For the 2d, "a skilful naval constructor;" a Surgeon in the navy to the 4th, and the 3d was left open.

In the first appointment to the second bureau, the Secretary, (Mr. Upshur,) remarks: "In providing a Chief for the Bureaus of Construction, Equipment, and Repair, the alternative was between a naval Captain qualified to equip, and a naval Constructor qualified to build and repair. I did not hesitate to prefer the former, and the place is filled by a member of the late Board of Navy Commissioners." A Captain in the navy continued at the head of this Bureau, with a Naval Constructor and Chief Engineer attached to the same, until the 1st of Nov. 1853, when a subsequent law took effect, disqualifying a C [illegible] sition, and leaving it open for the Secretary of the Navy [illegible] n any other grade or position, "a skillful Naval Con [illegible] has been the appointment of a Naval constructor [illegible] er in the navy attached to the same Bureau.

The Chief of the Bureau of [illegible] ter changing from

a Captain in the navy to a citizen, is now rightly filled by a Purser in the navy.

The Navy Department, as now organized, is peculiarly adapted to good government. The Hon. Secretary being the head of its several Chiefs, all subject to him, as he is one of several in like manner subject to the Executive, constitute it, in a remarkable manner, a systematic miniature of the beautiful organization of the government itself. And this system is perfectly applicable, in all its detail Every station is capable of being made a subdivision of the various Bureaus. A good *Administrator* at its head, therefore, is the essential quality to a harmonious performance of every function.

But notwithstanding this apparent symmetry, the office of Secretary of the Navy is beset with numerous obstacles to its faithful discharge.

Each and every officer in the navy cherishes a certain amount of political influence, which is continually being brought to bear on the Secretary, frequently from the most unsuspected quarters. Preference for agreeable occupation is natural to all. But the persuasive eloquence of a friend at the Capital, who is on social intercourse with the source of orders, has frequently led to the surprise of the Secretary himself at the succession of agreeable service of some officers, to the detriment of others less influentially represented.

The discipline which always distinguishes the good offcer seems not to have fortified him against calling in question the orders of the Department. If, for flagrant misconduct, an officer was tried by court martial, and sentenced to suspension, dismission, or to be cashiered—however just the decision—if the Secretary approved of it, his act was immediately called in question, and all the powers of a long cherished influence against the day of need were brought to bear against the execution of his office. The excess of this species of insubordination, and the yielding to it by a succession of Secretaries, has been the channel which eventually flooded the navy with every variety of inefficiency. To such a pass had the "customs of the service" come, that first orders from the Department were frequently regarded by those to whom they were sent as merely inquiring whether it was convenient for them to obey. And to enforce compliance —to the older officers especially—was deemed an unusual hardship. It was frequently the case that *three times* the number of officers necessary for a ship were ordered, in order to procure her complement, and so common was "getting off," that two were sometimes ordered simultaneously when only one was required; while there were some cases of open disobedience, for the object of obtaining a year's furlough! Shirking duty carried with it no ignominy, and how to *weather* most successfully became an object of study.

If duty was called in question, it was always surrounded by innumerable obstacles to its performance. A ship reported ready for sea by a Commandant would be found, on trial, unseaworthy. She was either ordered out of dock too soon, or because orders had not been given to effect certain repairs, or her ordnance equipments were not such as to admit of the greatest utility, her crew green—or a *something*, instead of any individual responsibility. An unharmonious performance of labor, because every one was unsatisfied with his own duty, leaving it half performed, to interfere with some other with which he knew nothing. For a ship to leave a station perfect in her appointments became the exception, and not the rule.

That selfishness, neglect, discord, and insubordination, backed by influences which make opposition dangerous for any one man, should at length reach such a point as to require a law of Congress to enforce discipline, was the only alternative of a conscientious Secretary.

The alacrity with which the Act of '55 was hailed by the navy and its every friend, was only exceeded by the universal favor of the knowledge and forethought of the President and the Secretary of the Navy, in their selection of officers to carry it into effect; and the public voice at that time would have almost ventured to retire the officer who would have dared to doubt the faith embodied in the selection. This law has virtually restored to the Secretary of the Navy the lost power of his office in enforcing discipline: and whatever may be the final result in the cases of the officers who have become subjects of the law, they serve to illustrate what we have above stated regarding the cherished influence of effective friends for objects ulterior to the powers of discipline. It is a remarkable feature of the discussion consequent on the effect of this law, that those members of Congress who have been foremost in proclaiming its injustice, are not those who, by their former acts, have shown any special interest in the good of the navy. Their conduct throughout has been only such as to show personal interest, friendship, and nepotism—precisely such interest as would, under other circumstahces, enlist their kind offices for agreeable duty or excuse from orders.

But the efficiency everywhere now manifest in the navy renders the benefit of the Act of '55 no longer a matter of doubt. However hard it may be for the inefficient to be overtaken in their inefficiency, no one can question the propriety of removing them when they become obstacles to the true principles of progress, and whatever the bonds of friendship, they should never stand in the way of discipline.

The habitual influence of friends has heretofore been so effectual and reliable to officers who would obtain agreeable duty, or consult their convenience before obeying orders, as not only to disarm the Secreta his power, but the same sort of influence has defied courts-martial

last, in the power of their might, arrayed Congress against itself, and appointed a court on a court!

Secretaries of the Navy have usually entered upon their duties with a general survey, the nature, extent, and importance of which has involved them into a contemplation of not only our own beginnings, but into the naval history of other nations long passed, ere they become fully alive to the unsuccessful labors of their predecessors in office. They then earnestly enter upon the duty, invoke legislation, science, and genius, in order to perfect the system, or to carry some favorite reform—and alas! their time is up! the administration over, and another succeeds.

But not so is the present era. The commercial enterprise of the nation long since predetermined the character of our navy. And its celebrity for past service is much more owing to that which constituted it than to the administration of its affairs. When the enterprise which constituted the navy no longer found province *in* it, it did not, on that account, lie idle, but took its legitimate channel, *Commerce*, and in this the same enterprise has excelled all the nations of the earth. The same energy, skill, and intrepidity, are equal to a navy on the same footing.

A reform long and loudly called for has been efficiently begun, and the present Secretary comes into office in the full possession of its powers, where he can, with good faith, take up the service where his predecessor left it. Never since we had a navy was a period so propitious for the benefit of a proper administration of its affairs. A happy organization, which is capable of being extended to the details of every station and ship for an *individual* responsibility to every office, and a restored power for the fearless discharge of duty, and the strictest enforcements of discipline. Congressional provision to begin with for having new ships constructed suitable to the wants of the nation, and which should be at least equal to the best of their class in the world, independent of every "auxiliary." An ample supply of old material, in *ten* useless ships of the line, for the exercise of repairing genius, that they may be converted into "auxiliary" steamers, razeed into useful sloops, or disposed of *a la Union*. The perfection of an apprentice system with a way open to a mastership and meritorious promotion, and a due award of pensions, with an increased ratio of pay for all, are subjects of prime consideration.

Heretofore, with few exceptions, the Secretary of the Navy has yielded to the pressure for control and dictation from subordinates of the Department, though the responsibility has been his, and not theirs, of any acts which he may have directed. The evils of this course will not mark the administration of Secretary Toucey. The characteristic high-toned independence of the present Secretary, furnish a sure guarantee for a different course.

No great measure will be undertaken, without due deliberation, and counsel from such reliable sources as are best calculated to furnish unprejudiced opinions, upon plans models and specifications first obtained, whether in or out of the navy.

The causes of failures and blunders in the navy have frequently arisen from confining the orbit of counsel to the inconsiderable stream of naval architectural knowledge and experience in this country. In this particular, Secretary Toucey will make his mark, and in doing so his enlarged views of patriotism will lead him to bring to his aid, the resources of mechanical genius throughout the Republic. We shall take pleasure in observing the reforms which will be instituted, and manifest equal pride in recording the signal success of his administration.

SCREW STEAMERS OF THE NAVY.

We give place with pleasure to the following communication relative to the vexed question of the performances of the Merrimac frigate, from one whose opportunities have been ample for obtaining correct information.

It may be safely asserted that during no administration of late years has there been so much done for the efficiency of the navy as has been done by the one just retired. And more particularly is the country indebted to the Hon. J. C. Dobbin, Secretary of the Navy, to whose indefatigable exertions must, in a great measure, be attributed the addition of the six new screw steamships, viz.: Merrimac, Minnesota, Wabash, Colorado, Niagara, and Roanoke.

Of the above ships, two are now engaged in active cruising, while a third, the Minnesota, is ready for immediate service. The Merrimac, of which ship we propose speaking more particularly) had her trial trip during some of the most stormy weather of last winter, and resulted to the entire satisfaction of all concerned, her machinery having been kept in constant operation for seven consecutive days. Two circumstances, however, of an unfavorable nature, attended this trial, viz, the coals were of a most inferior quality, giving *twenty-five per cent of dirt and ashes by weight*, while the slacking up of the rigging prevented such sail be carried at times, as was necessary to steady the ship, which circums detracted much from more favorable events.

The following is an abstract from the steam log for

Average daily performance of the U. S. Steam Frigate Merrimac, on trial trip from Boston Mass. to Norfolk, Va.

	K	F	Revol. per min.	Aver. Steam per hour.	Vacuum Starboard.	Vacuum Port	Throttle.	Cut Off.	Aver. Coal per hour.	Saturation.
1st day, 20 h.	10	4.7	40.4	15.9	21.5	20.7	1.8	1-8	2960.1	1 1-2
2d day, 24	7	5.9	31.5	11 6	22.6	21.5	1.0	1-8	2255.8	1 5-8
3d day, 24	5	4.3	34	11.7	19.	19.6	1.4	1-8	2448.8	1 3-4
4th " 24	6	6.8	37.1	10.7	20.7	20 3	2.0	1-8	2971.1	1 3 4
5th " 24	5	3.4	36.8	11.7	20.9	20.3	2.0	1-8	3151.2	1 3-4
6th " 24	3	5.5	36.7	12	20.8	20	1.2	1-8	5183.7	1 5-8
7th " 21	3	5.5	33.7	13.6	21.4	19.2	1.4	1-8	2943.8	1 5-8
8th " 5	—	—	43.2	17.6	22	21.7	1.8	1-8	2452	1 3-4

REMARKS.

Feb. 25th 1856.—Got underway from the navy yard Boston, fore and aft sails set.

Feb. 26th.—Strong breeze from N. W., ship rolling heavily, engines racing some. Split fore-top-sail. Set storm-sails.

Feb. 27th.—Moderate gales and squally. Ship rolling very heavily. Took in all sail. Wind on starboard bow, ship working seven knots under steam alone.

Feb. 28th.—Moderate breeze, and clear, with a rough sea.

Feb. 29th.—Moderate breeze, and clear, with a rough sea.

March 1st.—Head wind and sea.

March 2nd.—Heavy sea. Ship rolling very deeply. Engines racing badly.

March 3rd.—Moderate breeze and sea ahead.

From Norfolk she went to Annappolis, and from thence to Havana, during her trip to the latter place, an unlooked for derangement of the propeller occurred that was as unexpected as it was unfortunate at the time (but which resulted advantageously for the unfinished ships) viz., the wearing down of the propeller bearings. In the design of the propeller arrangements of these ships, the very best English practice known at the time was adopted in part, before a full report of their experience in this particular was received, and the results both in the Merrimac and Royal Albert were known here at the same time, as will be seen by the following extract of a letter received from England upon the arrival of the Merrimac at Boston in July.

"The couse of the accident to the Royal Albert, 130 guns, which was

mentioned in the newspapers a few weeks ago, has been explained. It appears that the screw and its bearings run in brass bushes. That portion of the screw shafting which passes through the stern tube is cased with brass, and works in a long brass bush or tube, in the stern-tube proper; then, in all these bearings, brass worked on brass. The bushes of the screw bearings, and the long bush in the stern-tube, had worn quite through, and the latter was broken, and large pieces of it worked inboard, forcing in the planking and gland. Such a quantity of water rushed into the ship, (the head being about 15 feet,) that the pumps could scarcely keep her clear; and as the first attempts to stop the influx of water were inefficient, she was gently run aground until a dam could be built across the passage for the screw shafting. Several vessels in the navy have been fitted in the same manner as the Royal Albert, and all have worn rapidly. When once the screw bearings begin to wear down, as much as a half bushel of brass dirt will sometimes work into the ship from the stern-tube, in a single day. This practice seems to have been adopted to prevent corrosion, which takes place so rapidly in immersed bearings in sea-water; but the remedy has proved worse than the disease. All vessels so fitted are now being altered to receive Mr. Penn's lignum-vitæ bearings."

As the propeller arrangements of the six new frigates were almost identical with that of the Royal Albert, as before stated, and as like causes produce like effects—*cæteris paribus*—it was not very surprising that some derangement should have occurred to the Merrimac. The only trouble, however, experienced in her case, was the suspension of her *steaming* until lignum-vitæ bearings were substituted for brass, after which she made the run from Boston to New-York in 47 hours, with the following results:

Average daily performance of the Merrimac from Boston to New-York.

	Running Time	Speed Per hour in knots.	Revol. per. min.	Steam per Guage.	Vacuum Starb.	Vacuum Port	Throttle per hour.	Cut-Off	Coal per hour.	Saturation.
1st day,	2 h...	9.0..	48.2..	14 ..	24 ..	22.7..	2..	14 in...	3222 ..	1 3-8
2d day,	22 ..	8.0..	41 ..	10.3..	24.1..	22.6..	2..	" ..	3078.3..	1 3-4
3d day,	23 ..	6.3..	39 ..	9.1..	23.4..	20.8..	2..	" ..	2536.9..	1 7-8
Average	47	7.66	41.6	11.13	23.8	22.03	2	14	2945.7	1.66

We regret not having any diagrams taken during the above run, but propose presenting a synopsis of the ship's performance before her de-ure for Europe, from the cards A., B., C., and D., on the accomp

plate, taken in April, but while steaming out of the Chesapeake Bay. She is furnished with two horizontal direct action engines.

Diameter of Cylinders	72 inches.
Stroke of Piston	36 "
Boilers, Martin's Patent	4.
Diameter of Propeller, (Griffiths', two blades)	17 ft. 4 in.
Developed area of the two blades	57.28 sq. ft.
Area of Screw, viewed as a disk	233.70 "
Area of Screw to immersed sectional area of ship	1 to 3.7
Pitch of Screw at Centre of Effort	26 ft.
Average Consumption of coals per hour	2880 lbs.

Average Pressure per Guages.

Steam	11.6
Vacuum	21-22
Revolutions per minute	41

Average total pressure taken from the cards, A. B. and C.	16.45
" back " "	6.26
" effective " "	10.19

From which we obtain the following total:—Horse power developed by both engines $= 4071.5 \times 10.19 \times 243 \div 33{,}000 \times 2 = 611.12$; but a deduction must be made for friction of engines, &c., the amount of which we ascertain from the friction diagrams. (See plate.)

From the above-named diagrams we find that the power necessary to overcome friction of engines, &c., amounts to 111.054 H. P., or 18.17 per cent of the total developed power of the engines, without the load; and as the friction increases with the load, some allowance must therefore be made for this increase, say five per cent of the total developed power, and we have: $111.054 \times 30.35 = 141.604$ H. P., and $611.22 - 141.604 = 469.51$ H. P. utilized in overcoming friction and slip of screw, and propelling the ship. Coal consumed per hour per effective H. P., 4.7 lbs. Pounds of water evaporated per pound of coal, 10.072. Square feet of immersed sectional area to H. P. 1.85.

We will briefly note two points affecting the operation of the boilers, viz.: the loss by blowing and the gain from the heater, which were as follows: Loss by blowing, 20.37 per cent; gain by heater, $694.5° : 100 :: 41 : 5.9$ per cent, or 1.81 tons of coal per diem.

Leaving New-York for Southampton, she made a most excellent passage, during which time she steamed 150 hours.

Average consumption of coal per hour	3116 lbs.
" Revolutions per minute	39.2
" Steam	14.7 lbs.
" Vacuum	25-19.8
" Throttle, (full being 8)	1.091

At Southampton some necessary repairs and alterations were made to her air pump valves, after which she took in a supply of Welsh coals, and left for Brest, making the run in 50 hours, against a strong head wind and heavy sea, during the first part of the passage. Latter part, light breezes, with heavy sea. Ship rolling badly. The following averages show her performance.

Average consumption of coal per hour, (Welsh,)	3669.5
" Revolutions per minute	41.5
" Steam	15.8
" Speed of Ship	6.5 knots.
Maximum Steam	24 lbs.
" Revolutions	52 per min.

The diagrams 1, 2, 3, 4, 5, 6, 7, and 8, (see plate,) were taken during the run, and were selected as being the nearest approximation to the ship's average performance for the run, and from which we gather the following data:

Average total pressure	19.28 lbs.
" back "	7.44 "
" effective "	11.84.

Total H. P. developed by both engines as follows: $4071.5 \times 11.84 \times 285 \div 330x0 \times 2 = 832.64$.

Having no data myself from which to ascertain the friction of the engines after the ship's arrival in Europe, I have availed myself of the calculation made from four diagrams taken after her arrival at Brest, and published in the *Artizan* for December, which gave, as engine friction, 143 H. P., and using one-twentieth of the total developed power as increased friction due to the load, we have $832.64 - 143 + 41.63 = 648$ H. P utilized in increasing friction and slip of screw, and propelling the ship. Coals consumed per hour per effective H. P., 5.6 lbs. Pounds of water evaporated per pound of coal, 9.16.

In the construction of the new frigates, high speeds, under *steam alone, was not expected*, indeed, was not considered essential to their efficiency as ships of war. Under ordinary circumstances, six knots, with steam

alone, was admitted to be sufficiently fast to satisfy the requirements of government, and in every case of the ships' trial they have exceeded its expectations largely. It should be borne in mind that the steam power applied to these ships is *exclusively auxiliary* to the sails, and to be used only in going into and coming out of port, and in time of action. It is, therefore, not a fair criticism, which has either the Collins steamers or the merchant screw ships as a basis of comparison by which to measure the efficiency of any of these new frigates *as steamers;* for in both cases quoted, the success of the enterprise commercially depends much upon their speed; and if coals be a measure of power, when used in well-constructed boilers or engines, and speed of the ships the result of this developed power, then it is clear—*cateris paribus*—that the more coals consumed the greater speed obtained, until it has arrived at its maximum; and from the foregoing reasoning, the more successful the ship; but in regard to the war steamers, as well as full powered, the great object to be obtained is to take advantage of every means to economise fuel; for obviously their efficiency as such is due, in a great measure, to the time they can remain at sea without going into port to replenish their bunkers. And therefore any inference drawn from such comparisons as we have referred to, must necessarily lead to erroneous conclusions.

In closing this article, it is deemed proper, in justice to the designer of the Merrimac's engines, as well as to the Board that accepted them, to correct a mistake made by the Southampton correspondent of the *Artizan*, in his letter to that journal of October 23d. In his description of her machinery the following, in regard to her cut-off valve, appears:

* * * * * "*And there is also a separate cut-off, or expansion valve, worked by a separate eccentric, the varying expansion being obtained by a slot in the lever or weigh shaft, which works the cut-off valve, and by which the stroke of the slide may be lengthened or shortened at pleasure. This is, of course, a very imperfect mode of working an expansion valve,*" &c. &c.

This statement is *not* correct, save in one particular, viz.: that there is also a separate cut-off, worked by a separate eccentric. So far he is correct, but no farther.

The following description, we hope, will make the arrangement clearly understood:

The cut-off valves are simply five ported slides, worked by a separate eccentric, movable on a disk secured to the shaft, the varying grades of expansion being obtained through the agency of a screw-bolt and nut, the bolt being secured to the disk, (and immovable,) while the nut, (the

screwing or unscrewing of which alters the grade of expansion,) is fitted between jaws cast in the inner circumference of the eccentric ring, and through which the bolt passes, and so arranged as not to effect the lead in altering the point of cutting off. S.

REMARKS.

Our correspondent, "S.," places the success of the *Merrimac* and her consorts upon new ground—we think so far inland as to be high and dry ashore, viz.: *the requirements of the government*, the expectations of which have been exceeded largely, in the trials of the new frigates. We desire the government to take note that although the facts may furnish *excuse*, the results will fail of means for defence, for the slow performance of these vessels either under steam or canvass. The truth appears to be that the "Department," was humbugged by counsel into the idea of adopting the principle of "auxiliary" steam power to aid sail in the propulsion of war vessels. European nations having thought they saved their naval hulks from the discarding hands of time and progress by introducing "auxiliary" power for propulsion, our government advisers, in imitation of those long-shore coblers, thought it must be equally advantageous to apply this saving principle to *new* ships. We hope the mistake will be corrected in future, and at least one ship of our navy be provided with full power of some kind equal to the task of a successful pursuit and capture of one of Collin's or Cunard's steamers. We will go further and say, that when the advisers of the Department shall be selected from a fresh company of Naval and marine *mechanics*, who would scorn to lay the failure of their designs upon the unwary head of the Navy Department, but would be prepared to shoulder their own proper responsibilities either in design or execution then we shall hear less of hermaphrodite methods of propulsion and the moderate requirements of the Department. We say to the Hon. Secretary of the navy and the public that the *executive* responsibility of his office only belongs to him—the professional responsibility belongs to the Bureaus, according to the duties of each. If the head of a Bureau seeks orders in detail, involving the recommendation of a model or a plan, with a view of anticipating the approbation of the secretary of the navy, and thus relieving himself of responsibility, he should be promptly dismissed. No, the secretary of the navy is not directly the responsible party for the model and engines of a ship of war; his functions are strictly executive, and not mechanical.

We observe that mention is made in the log that the *Merrimac* rolled *very deeply*—rolled badly, &c.; we inferred as much from the model when the ship was first in frame. The bottom of the body of the ship is too

sharp for the position of the centre of gravity, and the proportion of breadth given. Great deadrise, or sharpness of floor is a bane of the *naval* service, whence it found its way into merchant shipping where it has been thoroughly exploded. A vessel with great deadrise will not carry a deck-load of merchandise with ease and safety in rough weather, and a battery of guns carried on the sides is infinitely more detrimental and dangerous to such a ship. The ends of the *Merrimac* are too heavy above water—another cause of instability. In a heavy sea we fear it will be difficult to handle her battery, and it would not surprise us if the model like the brass bearings for the screw shaft, should be found altogether too antiquated for success.

DR. ELISHA K. KANE.

The death of this distinguished man occurred in Cuba on the 16th of February, 1857, where he had gone in search of health. Though young, his career was filled with scenes of daring and perilous adventure, undertaken in the cause of philanthropy and science, which will long embalm his memory.

On leaving the medical university, he received from the medical journals not only of his own country, but of Europe, the highest tributes of praise for the value and ability of his graduation *thesis*. On entering the navy he at once demanded active service, and was attached to the first embassy to China. He explored the accessible parts of China, Ceylon, India, and the Philippine Islands, in one of which group he descended about eight hundred feet into the crater of a great volcano, and while there made a sketch of the interior. He visited Egypt and Greece, traversing the latter country on foot on his journey home. He was next sent to the coast of Africa, and contracted the fever, from the effects of which he never entirely recovered. Not yet dispirited, though returning with a shattered constitution and declining health, he sought an appointment in the army of the war against Mexico, and was sent on a perilous mission by the President, with important dispatches to General Scott. He was next employed in the coast survey then in the Gulf of Mexico, and while there was ordered to join the first Arctic expedition in search of Sir John Franklin and his companions, and though some 1200 miles from New-York, the point of departure, was actually on the voyage within nine days. Returning from that expedition, he set on foot another, of which he was the Commander. This expedition, after suffering almost incredible hardships, ob-

served, it is supposed, the most northerly point of land on the globe, reporting the lowest temperature ever endured by civilized man, and made the important discovery of the open polar sea. After his return he was occupied with the publication of his narrative of the expedition. When finished, he sailed for Europe, for the benefit of his declining health, now prostrated by his unremitting toil and exposure. Finding little or no improvement, he sailed for Havana, where he terminated his eventful career.

The combination of qualities in Dr. Kane's character were such as are required for this age, and such as to command admiration. He was bold, daring, self-reliant, energetic, and always alive to the calls of humanity. He possessed unbending energy of character. His giant will was too powerful for the frail fabric of his physical frame. His resolute purpose was blended with the sober traces of patient and laborious inquiry, annexed to a sound practical judgment. His memory will be enduring, not only for his heroic daring and scientific attainments, but for his liberal, self-sacrificing efforts in behalf of others. His mortal remains have been brought to his native land, and interred in Philadelphia.

A SAILOR'S TRIBUTE.

Impromptu Lines, composed while the boats escorting the remains of Dr. E. K. Kane were approaching the Steamship Cahawba, lying at Havana.

Behold that sad approaching train,
  Silent cleave the weeping water!
Those trailing flags, half-mast, proclaim—
  They bring the hero and the martyr;
A martyr of no common fame,
  The hero of no bloody story—
No orphans weep a father slain,
  To dim the lustre of his glory;
Oh no! a bright, unblemished fame
Belongs to philanthropic Kane!

How solemnly the oarsmen row
  A measured, deathly cadence keeping,
No hired mourners shriek their woe,
  Nor cannon's roar, nor drums are beating!
But solemn, silent, sad and slow,
  The funeral barges on are sweeping,
While burning tears in pity flow,
  And manly eyes, unused to weeping,
Weep now in memory of Kane,
  The hero of unblemished fame.

Hugh McKay.

THE EFFICIENCY OF STEAMSHIPS.

For some time past we have been silent observers of an interesting course of correspondence in the columns of the London *Artizan*, upon the problem of determining in figures, the efficiency of steamships for earning money, and for separating the performances of the engine from the qualities of model. Three distinguished writers have discussed the subject, and each other, contending for the truth of this formula and that, and disagreeing very widely in their theories of the correct relation of the resistance of vessels to the engine power requisite for various velocities. In common with other marine architects or engineers, we hold to some truths on this great subject, and intend to offer them for the common good when opportunity shall invite; but we have preferred to await the closing of the controversy in the *Artizan* before launching our bark upon the troubled waters. The subsidence of the gale in London has thrown upon our table the following letter from one of the distinguished authorities engaged in elucidating the problem in question, and we take great pleasure in giving it publicity in the Nautical Magazine.

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11 Mercer's Terrace, Salmon's Lane
Limehouse, E. London, 1857.

I beg to call your attention to a subject that is now receiving marked attention in the columns of the *Artizan*, viz.: "Steamship Capability," and the "Arithmetic of Naval Architecture." In these communications, the generally received opinion that the propelling power varies as the *cube* of the velocity is denied, both by arguments and facts, and a basis proposed for separating the performances of the engine from the question of the form of vessel.

In my opinion the formula there proposed for calculating the velocity of steamships is deserving of your most serious attention, however difficult the problem may have appeared. Of the value of this formula, $\frac{V^2 \frac{3}{4} \text{I. H. P.} \times 100}{\text{Mid. Sec.}}$ you may judge by its application to the following vessels of the most opposite types:

	Actual Speed.	Formula Speed.
Thus the Minx gives	5.15	5.09 miles.
Vulcan	10.97	10.68 "
Ajax	8.168	8.36 "
Encounter	11.83	11.728 "
Himalaya	15.65	15.75 "
Sharpshooter	11.17	11.27 "

Again, the best form of screw propeller is so distinctly defined that the engineers of this country would be consulting their own interest in supplying the necessary data to the *Artizan*, for the refutation or corroboration of this theory. To all parties interested in steam navigation, the subject is of the utmost importance. The primary object of those communications is to reduce naval architecture to an exact science, and to point out how steamships may be made remunerative at high velocities without government assistance.

I am, sir, yours respectfully,
ROBERT ARMSTRONG.

P. S.—I will esteem it a favor if you will furnish me with accurate details of vessels and their machinery as you may be enabled to do, and the particulars of their performances, stating when the trials were made, as also where, and under what circumstances. These may either be furnished to me at my address, as above, or under cover to the editor of the *Artizan*, 3 Agar-street strand.

The following data are most essential to the object of the communications:

Dimensions.
Displacement. } at a given depth.
Midship Section. }
Consumption of Coal per hour and per voyage, and the length of voyage.
Rate per hour in fine weather.
Average Rate
Draught of water forward.
Draught of water aft.

Notwithstanding the apparently successful application of Mr. Armstrong's formula to the vessels above cited, we must hesitate to receive it as correct. Neither can we adopt that of Mr. Atherton, (one of the controversialists— $\frac{V^3\ D.^{\frac{2}{3}}}{I.\ H.\ P.} = C =$ coefficient or dynamic value. Another party to the discussion, (G. J. Y.) insists roundly upon adopting *length* as an element of vast importance in deducing a correct formula.

We have not the time and space at present to review the discussion in the *Artizan*, but will call the attention of American architects and engineers to the following theorems laid down by Mr. Armstrong, and which are, by this writer, elevated to the very questionable dignity of "axioms," established by his investigations!

"1st. That the rate of sailing between two vessels with an equal moving power in each does not depend on any form, but entirely on the area

of the immersed midship section, or the greatest section to the line of motion.

"2d. That displacement in the line of direction does not materially add to the resistance.

"3d. That the resistance of a vessel passing through the water is exactly as the square of the velocity; or to propel a vessel twice as fast, it only requires four times the propelling power.

"4th. That the amount of friction between a solid and liquid is not necessary, in any calculation for any required velocity."

When such extraordinary fallacies, as they appear to us, spring from mathematical investigations, we do not wonder that practical minds to whom "axioms" are as plain as to the more speculative, reject the dogmas of theorists.

The resistance of vessels, when moving in still water, must be referred to the *model*, *displacement*, and *friction*, in the teeth of any teaching to the contrary.

The computation of horse power, whether nominal or indicated, as at present practiced, is a gross delusion. The *work* of an engine should not be taken for its active power. Power is legitimately the ability to overcome inertia, and in the case of steam, should be measured by its instantaneous pressure upon the piston. Power is a term used in the acceptation of *force*, and misleads the mind by being combined in calculations with *velocity*, which is but the product of force. The unphilosophical idea of combining a *cause and its effect* with notions of the dynamical capabilities of an animal for the eduction of a unit of measure for the force of a steam engine, has led not only to confusion, but gross error. We have no confidence whatever in calculations based on this false theorem in science. To common sense it must be quite plain that time, or velocity, should be excluded from elementary expressions of steam engine efficiency, and the active power of steam would be best understood by the tons weight which it could balance on the scale beam.

Those of our readers who feel interested in the subject will no doubt serve the cause of science by communicating the information called for by Mr. Armstrong, either to him or to the NAUTICAL MAGAZINE. Meanwhile we refer him to our past volumes for particulars of American vessels. In a future number we hope to present our views of the arithmetic of marine architecture, and lighten up the subject, so far as we may be able.

SHIPPING REVIEW.

FREIGHTS IN MARCH.—The month of February closed with extremely dull rates to Great Britain. The market generally was also dull. Vessels suitable for the West India trade continued in good request, but there was no scarcity of tonnage, and engagements remained at former prices.

MARCH 4.—No important changes were made, but little was doing, except in the West India trade, for which vessels of suitable tonnage were in good demand, and rates slightly advancing. Grain to Liverpool at 4½ d. in bulk, and 5½d. in ships' bags; flour, 1s. 6d. *a* 1s. 7½d.; cotton, 5-32d. *a* 3-16d.; rosin, 2s.; a circus company, including 44 persons, 20 carriages, and 84 horses, $6,000. To London, flour 1s. 9d. *a* 2s.; turpentine, 2s. 6d; oil cake. 20s. per ton. To Havre, rosin, 65c. per bbl.; flour, 65c.; ashes, $8 and $9. Charters: a ship from Cardiff to New-York, railroad iron, *a* 25s.; a schooner, 145 tons, to Bathurst, Africa, and back, $2,000; a schooner, 129 tons, to a windward W. I. island and back, $1,110; a brig, 200 tons, to Ponce, R. R., and back, sugar, 40c., and molasses, $3.25, or all molasses $3.50 under, and $3.25 on deck.

At New Orleans, Feb. 21, freights were dull and quiet. Cotton to Liverpool, ½d.; to Havre, 1 1-8c. Coastwise rates very low, and many vessels on berth. At Mobile, market dull and declining, cotton from 3-8d. to ½d.

At Boston, March 1, rates to California remained as previously quoted—rather more were offering to Liverpool, but prices remained low. To southern ports a fair amount of trade doing, and coal freights active at $2 per ton from Philadelphia.

MARCH 11.—No material change, and business moderate. Shipping in the gulf ports that had been long and fruitlessly waiting for "improvement in rates," have begun to make engagements, in despair of the "good time coming."

MARCH 14.—The market remains steady, business being moderate. Grain to Liverpool at 4½d. *a* 4 3-4 d.; flour at 1s. *a* 1s. 3d.; turpentine, 2s. 6d. per 280 lbs. To Hamburgh, cotton, ½c. To Marseilles, flour, 95c. To California the offerings continue extremely light—25c. per ton for measurement goods; $9 per ton for pig iron. Charters: to Valparaiso and Callao, lumber, at $12; to Montevideo and Buenos Ayres, lumber, $13. A ship from Calcutta to New-York, $14 per ton, ship paying port charges. Ship 470 tons, from Leghorn to New-York, Boston, or Philadelphia, $3, 600.

At Boston, March 11—To California rates continued dull. Moderate engagements at 25 *a* 27½c. per foot; $10 per ton for coal; ½c *a* 5-8c. per lb. for dead weight. To Australia and Liverpool no change, and very little offering. To southern ports no change. To New-Orleans, 6c *a* 7c. per foot, 25c *a* 30c. per bbl., and $2.50 *a* $3per ton. Coal freights from Philadelphia rule at $1.75 *a* $2 per ton.

SEAMEN AND WAGES.

Complaints are made that sailors have again become scarce, although rates remain without change worthy of note since our last. We have elsewhere, in this number of the MAGAZINE, given our views upon the present and prospective of seamen, and have only to add, here, that the aid of steam should be invoked more extensively on ship-board. This measure would be the means of calling into the service of shipping a superior class of men to those whom it would displace, and an advance of wages, with a relief from scarcity of seamen, would necessarily be consequent. Wages indicate, with some degree of accuracy, the skill

and enterprise of working men, and good men are ever expected for high wages, and, in the end, they are forthcoming.

SALES AND PRICES OF SHIPS.

We note the following sales of Lake shipping at Cleveland during the past winter, and tender our acknowledgments to a subscriber in that flourishing city for his favor in communicating the report of them:

Schooner Star of the North, three years old, built at Cleveland, for $11,000. She is 287 tons measurement.

Schooner Star of Hope, one year old, built at Cleveland, 375 tons burthen, for $16,000.

Schooner G. S. Rewman, two years old, built at Black River, Ohio, 387 tons, for $12,500.

Schooner W. B. Castle, one year old, built at Cleveland, tons for 10,000, sold by D. P. Dickerson to Crawford, Price, & Co.

Schooner S. Robinson, four years old, built at Cleveland, 300 tons burthen, for $10,500.

Schooner Eagle Wing, one year old, 350 tons, for $16,000.

The above prices indicate a good state of the market, especially in view of the fact that new tonnage is being built for $42 per ton by contract. The prices have been advancing on the Lakes for the past ten years, and must still farther advance, before vessels suitable for the navigation of our inland seas shall be built quite up to a profitable standard of qualities and equipments.

SHIP-BUILDING.

An unfavorable discrimination against vessels built in the State of Maine has been instituted by the insurance authorities of New-York; and where no other reason for this course is apparent, the fact that the secrets of construction are *unknown* seems to account for it. To assume that there are no first class, good, and safe vessels built in Maine is equally absurd as to presume that no poor unseaworthy craft are built in other and western Atlantic States.

The intrinsic qualities of shipping *can be ascertained* for the purposes of the underwriter, and the flimsy device for rating ships' characters according to "States" and points of compass, whither built, is unworthy the intelligence of any mercantile man except a Chatham-street Jew. There are ship-builders in Maine, as well as New-York or Massachusetts, who never build vessels unworthy of confidence; yet such is the shabby mode of inspection recognised by our New-York underwriters, that they are never made aware of the difference between the character of one Maine ship and another—the same being true of vessels from any other quarter. We happen to know that a remedy for this condition of things, in the form of an efficient system of marine inspection, was recently presented to the attention of distinguished members of the underwriting community in New-York, and to our surprise, met with very indifferent encouragement. What the New-York underwriters appear unable to do for themselves, they feel unwilling to have others do for them. This, however, we believe, is natural to all men. We can only say that a proper system of marine inspection, in the hands of capable and honest inspectors, would restore alike the lost rights of Maine ship-builders, and correct public sentiment in regard to the qualities of shipping, wherever built.

The construction of five steam sloops of war will soon give life to our navy-yards again, and if our merchants in the trans-Atlantic trade determine, as we think they will ere long, to substitute steam-propellers for packet-ships, we may look for increased activity in the future of ship-building.

NOTICES TO MARINERS.

Notice is hereby given, that the Minot's Ledge Vessel, which was removed for repairs of injuries sustained during the late gale, has been replaced upon her station.

C. H. B. CALDWELL, Light-house Inspector, 2d Dist.

Boston, Feb. 4, 1857.

A platform and quarters for a working party have been erected on the Florida Reef, about forty-five miles to the eastward of Sand Key Light-house.

These works have been erected for the purpose of constructing a first order Light-house tower, and will remain until the structure has progressed so far that they can be dispensed with.

The quarters are about twenty-five feet above the surface of the water, and should be visible in good weather *ten* nautical miles.

W. F. RAYNOLDS, First Lieutenant Topographical Engineers.

Key West, Fla., Feb. 10, 1857.

MEDITERRANEAN—SEA OF MARMORA—LIGHT ON STEPHANO BURUN.—Official information has been received at the office of the Light-house Board, that the director of lights for the Turkish government has given notice, that on and after the 4th day of January, 1857, a light would be established on Stephano Burun, on the north side of the sea of Marmora, near the entrance of the channel of Constantinople.

The light is a fixed white light, varied every two minutes by flashes, which are preceded and followed by short eclipses. The light is placed at a height of 78 feet above the level of the sea, and should be visible from the deck of a ship in clear weather at a distance of 12 miles.

The light is seen through an arc of the horizon of 195° from E. by N. ½ N., round southerly to W. 1-8 N., except for the half point from W. by S. to W. by S. ½ S., where it is interrupted by the tower of a kiosk, which will shortly be removed.

The light-tower is 65 feet high from the ground, and stands on the point of San Stephano, at 723 yards E. by N. ½ N. of the above-mentioned Sultan's kiosk, in lat. 40° 57' 14" N., long. 28° 50' 34" west of Greenwich.

All bearings are magnetic. Var. 8° 35' W.—

THORNTON A. JENKINS.

Washington, Feb. 18, 1857.

LIGHTS AT THE LOFOTEN ISLANDS, WEST COAST OF NORWAY.—Official information has been received at the office of the Light-house Board, that the Royal Norwegian Marine Department at Christiania has given notice, that on and after the 1st day of January, 1857, the following lights would be established at the Lofoten Islands, on the northwest coast of Norway:

Glopen.—This light is a fixed white light of the sixth order. It is placed at a height of 140 English feet above the mean level of the sea, and should be visible from the deck of a ship in clear weather at a distance of 12 miles, from S. W. round southerly and easterly to N. W. It will be lighted from the 1st of January until the 14th April.

The light-house stands on the south side of the entrance of Sorvaagen, serves to point out the fairway into that harbor It is in lat. 68° 3' N. lon. 18° 4½' East from Greenwich. Vessels approaching Sorvaagen between the light and Kraagen islet (which lies to the N. N. E.) must keep close to G open as there are three blind rocks on the S. E. side of Kraagen. If approaching to the north of Kraagen, they should keep close to that islet. When the light has been brought to bear to the eastward of S. by E. there is anchorage in from 8 to 10 fathoms.

Sreino, near Balstad.—This light is a fixed *red* light of the sixth order. It is pl[illegible] height of 200 English feet above the mean level of the sea, and should be visib[illegible] deck of a ship in clear weather at a distance of from 8 to 10 miles, from N. W. [illegible] erly to N. E. It will be lighted from the 1st January until the 14th April; an[illegible] chiefly as a guide for the passage between Henningsvaer and [illegible].

The light-house stands in lat. 68° 3' N., lon. 18° 34½' E. f[illegible]ich.

Henningsvaer.—This light is a white light of the fourth [illegible] y a flas[illegible]

minute, seen all round the compass. It is placed at a height of 120 English feet above the mean level of the sea, and should be visible from the deck of a ship, in clear weather, at a distance of from 12 to 14 miles. It will be exhibited from the 15th August through the winter until the 1st May.

This light is placed on the Quitvaerden near Henningsvaer, and serves chiefly to point out the fairway across the West fiord; also for making for the anchorage in Saltvaering Sound. To reach the latter, the light must be brought to bear N. E. by N., and that course kept until about three cables' length from the light-house; then altered a little more easterly in order to pass south of the light, and when two or three cables' length to the eastward of it, the vessel may be brought up in from 5 to 6 fathoms water. The anchorage is narrow, and cannot be recommended for large vessels.

All courses and bearings are by compass. Var. 16° W. in 1857.

THORNTON A. JENKINS.

Washington City, Feb. 25, 1857.

THE "EEL GRASS SHOAL LIGHT VESSEL."—Has been replaced upon her Station, and will exhibit her light as heretofore.

The spindles on "Latimer's," "Ellis'," "Turner's," and "Watch Hill" Reefs, Fisher's Island Sound, N. Y., have been carried away by the ice. The positions will be marked by spar buoys as soon as possible.

The iron pile beacon marking the "South-West Ledge." at the entrance to New Haven harbor, has also been swept away; its position will be marked by a can buoy of the second class, painted red.

The buoys marking the channels across the bars and through the lower bay of New-York are in their proper positions.

A spar buoy painted red has been placed in 19 feet water opposite the site of the iron beacon on the Romer shoal, and a spar buoy painted with black and white perpendicular stripes to mark the entrance to Gedney's channel.

A. LUDLOW CASE, Light house Insp. 3d dist.

February 27, 1857.

The buoys in New Haven harbor and the channel leading to it, have been replaced in their proper positions.

A. LUDLOW CASE, Light-house Inspector 3d Dist.

New-York, Feb. 28, 1857.

MEDITERRANEAN—IONIAN SEA—REVOLVING LIGHT ON CAPE SPATHI—CERIGO.—Official information has been received at the office of the Light-house Board, that the Lords Commissioners of the Admiralty of Great Britain have given notice, that on and after the 1st day of March, 1857, a light would be established on a tower recently erected on Cape Spathi, at the northern extremity of the island of Cerigo, for lighting the Cervi channel.

The light will be a revolving white light, showing a bright face every half minute. The illuminating apparatus is catoptric, or by reflectors, of the first order. The light will be placed at a height of 363 feet above the mean level of the sea, and should be visible in clear weather from the deck of a ship at a distance of 24 nautic miles.

The portion of the horizon intercepted by the land of Cerigo is 102°, the light will therefore only be visible through an arc of 258° or from W. S. W. 1-3 W., (S. 72° W.) round northerly to S. S. E. 2-3 E. (S. 30° E.)

The light tower is circular, of stone, surmounted by a lantern painted white, and is 38 feet high from base to vane. The keepers' dwellings are a low white building, a short distance to the southward. The light tower stands 573 yards south of the extreme pitch of Cape Spathi, in lat. 36° 22′ 50″ N, lon. 22° 57′ 30″ East from Greenwich, nearly

All bearings are magnetic. Variation 9° 45′ W. in 1857.

THORNTON A. JENKINS.

Washington. March 5, 1857.

MEDITERRANEAN—SEA OF MARMORA—LIGHT ON THE FANAR ISLET.—Official information has been received at the office of the Light-house Board, that the Director of Lights for the Turkish Government has given notice, that on and after the 15th day of February, 1857, a

light would be established on the Fanar or Light-house islet, off the eastern point of Marmora island, in the Sea of Marmora.

The light is a fixed white light, varied every two minutes by red flashes. The illuminating apparatus is a lens, but it is not stated of what order. The light is placed at a height of 192 feet above the mean level of the sea, and should be visible from the deck of a ship in clear weather at a distance of 12 miles.

The light tower stands on the islet, off the east end of the island of Marmora, in lat. 40° 37′ 40″ N., lon. 27° 46′ 0″ East from Greenwich.

Variation of the Compass, 7° 20′ West in 1857.

THORNTON A. JENKINS.

Washington, March 5, 1857.

In accordance with previous notice, a fixed white light of the 4th order Fresnel system, has been substituted for the fixed red light heretofore in use at "Execution Rocks Light-House," New-York. It was lighted for the first on the morning of the 6th inst., and will be exhibited nightly hereafter from sunset to sunrise.

At the same time, the fixed white light of the 5th order Fresnel system, heretofore in use at Sends Point Light-House, New-York, was discontinued, and a revolving light of the 4th order do, showing a flash every thirty (30) seconds substituted for it.

A. LUDLOW CASE, L. H. Inspector, 3d Dist.

New-York, March 7, 1857.

The "Bartlett's Reef Light-Vessel" has been returned to her station in Long Island Sound and will exhibit her lights as heretofore.

The Buoys marking the rocks and reefs at the entrance to Narraganstt Bay, and the channels and obstructions in it and Providence river, R. I. have been replaced in their proper positions.

A. LUDLOW CASE, Light-house Insp., 3d Dist.

New-York, March 7, 1857.

Notice is officially given, that the following buoys have been replaced in Boston Bay :—

Spar buoy, red and black horizontal stripes, near Barrel Rock.

Spar buoy, red No. 6, off False Spitt. Light-House Channel.

Can buoy, black, 2d class No. 5, on Ram Head Bar.

C. H. B. CALDWELL.

PORT OF LIVERPOOL.—Official information has been received at the office of the Light-house Board that the trustees of the Liverpool docks and harbor have given notice that the following changes in the buoying and lighting of the northern approaches to the port were carried into effect on the 6th of October last:

Crosby Light-House.—A light was exhibited at Crosby Light-house, at sunset of the above date, and continued every night from sunset to sunrise. The light is stationary, of a red color, elevated 96 feet above the level of the sea at half-tide, and visible between the bearings of S S E ½ E and E, which limits will indicate respectively when a ship is westward of Formby spit, or to the southward of the Crosby light-ship.

Formby Old Light-House.—The light in this tower was discontinued on the evening of the above date.

Formby light-ship was moved from her former berth, S E by S ½ S, half a mile, into 33 ft. at low water. Crosby light-house bearing E by S, 3-4 S southerly; N W mark N E by E ½ E. Crosby light-ship S E, distance 1 5-8 mile.

Crosby light-ship was moved from her former berth N by W ½ W, 330 fathoms, into 46 feet at low water. Crosby light-house E ½ S: N W mark N E 3-4 N.

The Bell beacon was moved from her former berth north 200 fathoms, into 25 feet at low water. N W light-ship S W ½ W, distance 8 5-8 miles. Formby light-ship E by S 3-4 S southerly 3 1-8 miles.

K. 1. Black nun buoy was moved N E by N, ½ mile into 18 feet at low water. N W light-ship W ½ N, 2½ miles. Bell beacon N by E 2½ miles.

V. 1. Red can buoy was moved N W by W, 180 fathoms, into 12 feet at low water. V 1. Black nun buoy N by E 3-8 mile nearly. Bell beacon N W by W 5-8 of a mile.

V. 2. Black nun buoy was moved south, 45 fathoms, into 20 feet at low water. V. 2. Red

Can buoy, S E by S, ½ mile nearly. Formby light-house E S E 1 3-4 miles.

Zebra Fairway buoy was moved N E ½ E. 325 fathoms, into 12 feet at low water. Formby light-ship S S E, 2½ miles nearly. Bell beacon S W by W, ½ W, 2½ miles. Crosby light-house. S E by ½ E.

Z. 1. Black and white (striped vertically) nun buoy was moved N ½ E, 140 fathoms, into 5 feet at low water. Formby light-ship S by E 3-4 E, 1½ mile. Crosby light-house S E. by E

Z. 1. Black and white (striped horizontally) nun buoy was moved N 3-4 E ½ a mile nearly, into 7 feet at low water, on the N E edge of Zebra bank. Formby light-ship S S E 3-4 E, 1 ¾ miles. Crosby li ht-house S E by E.

Q. 1. Black and white (chequered) can buoy was moved 100 fathoms N N E into 10 feet at low water.

New buoys were placed as follows, viz.:

Queen's Channel Fairway.—A black nun buoy, with perch and ball, marked Q. Fy. In 27 feet at low water—V 1, Black, S S W ½ W, ½ a mile. Bell beacon S W by W. ½ W., 1 mile. Formby light-ship, S. E ½ E, 2 2-3 miles. Crosby light-house S E by E ½ E

Victoria Channel—On each side of the bignt in the west middle shoal, supplementary buoys were placed. S V-1 Red and white (striped horizontally) small can buoy on the south side. In 12 ft at low water—Formby light-ship, south-east by east ½ east 3-4 mile. C. 1, Black, north-east by east ½ east 2-3 of a mile. v. 3, Red, with perch, north-west by N. S. V. 1, can buoy, S. by east, 1-3 mile.

S. V. 1, Red and white (striped horizontally) small can buoy, on the S. side.

In 12 feet at low water—Formby light-ship E S E 3 4 mile nearly. C. 1. Black, N. E. ½ E, 5-8 mile. V. 3. Red, with perch, N N W ½ west, ½ a mile.

Sailing Directions.—*Victoria Channel*—A ship coming from seaward, by bringing the Formby Floating light to be r E by S 3 4 S southerly, will have that object, the bell beacon, and the Crosby shore light in one. And after passing the bell beacon, by keeping the lights in one, may steer on that bearing up the Victoria Channel, until abreast of V. 3, black, or until Leasowe light bears, S ½ west, and Rock Light bears S S E ½ E, then, haul up until the Crosby light ship opens eastward of the Formby light-ship, when you will be in the Fairway, and may steer for the Crosby light-ship. Should there be sufficient water, instead of hauling up as above she may continue her course with the Formby light-ship and Crosby shore-light in one, and so pass in the best water, (8 feet at low water, the same as in the Queen's Channel.) over the west middle into the Crosby channel. The navigation of this part of the channel by day will be facilitated by the placing of the nun and can buoys S V 1, before described, by passing between which the shoal parts of the west middle will be avoided.

Queen's Channel.—Having sighted the bell beacon, a course from it N E by east ½ east, one mile, will bring you to the Fairway buoy of the Queen's Channel, (black, with perch and ball,) from which Crosby light-house bears S. E. by east, ½ east. With this bearing for a course, steer till the Crosby light-ship comes well open eastward of the Formby ship, when you may shape your course for the Crosby ship, observing to keep well to eastward of the Formby ship, to give a wide berth to the shoal elbow of the west middle.

Zebra Channel.—A course from the bell beacon north east by east ½ east, 2½ miles, brings you to the zebra Fairway Buoy, from which a south south east course will carry you in the deepest water through this channel to the Formby ship. This channel is very narrow.

In sailing upon any of the bearings above named, the set of tide must be considered.

N. B.—A chart of the northern channels, from the survey of 1856, exhibiting the light-ships, buoys, &c., in the positions above described, will shortly be published.

Thornton A. Jenkins.

washington, March 12, 1857.

The Ship Mandarin.—This vessel, the lines of which will be found in the present volume, was built in New-York by Messrs. Smith & Dimon, and launched in July, 1850. Her dimensions are as follows—151½ feet long; 33 feet six inches wide, 19½ feet depth of hold, and 776 tons. Her performances have justly called forth commendations from Lieut. Maury, in a recent letter to the Hon. Seccretary of the Navy, which was published in our last issue.

OUR STATE ROOM.

SEAMEN.—"Cruelties on board American ships" has of late formed a topic for several of the English papers, but most of all, for that philanthropic, far-seeing *Times*, which would, if it could, reap a harvest from the gleanings of the *grog* impressment system which has of late years taken the place of national in England, and become the now legal way of making up for the scarcity, in both England and America. But cruelties on board *American* ships is the point of all the *Times* has said or would say, in order that English ships may find their—*cruelties* as well as sailors—more abundant for their own trade. But the utter absurdity of the *Times'* statement that "hundreds of seamen are annually *turned* ashore at Liverpool, in an utterly wretched condition, and ruined in health from the treatment they have received on board the *American* ships in which they have sailed" is palpable to all who know anything either of the character of the *Times* or of the "seamen." Tut the *Times* credits the "*Liverpool* Society of Friends of Foreigners in distress" for all that is stated. These poor distressed foreigners principally consist of returned emigrants, unfortunates who have, many of them, been shipped from the vilest dens in Liverpool to New-York, where they have soon found a level in the sailors *Impressment* Society, that is to say, fallen into the hands of the shipping landlords and crimps who agree with the duly authorised agents of merchants to furnish crews according to time required.

When a ship is ready for sea, the crew is mustered on deck, according to contract, and each one is required to answer, as called from the "Articles," in the presence of the Captain, or other officer of the ship. This being done, the advance is paid over—from twenty to forty dollars, and the stipulation for monthly wages of (now) twenty dollars besides, is fathered. On an average, ships thus manned make the voyage to Liverpool in twenty days. If, out of a crew of forty men thus shipped, one in six turns out to be a seaman, the proportion is deemed good. And it is no uncommon thing for ships to be detained after the crew is shipped, for want of seamen. In some instances there are only two or three found in the whole compliment—say forty—required, though all answer, according to instructions from the *impressment* villains, that they have been to sea. Such are the "seamen," which, on arrival at Liverpool, *turn themselves* ashore by hundreds on the Liverpool Society of Friends of Foreigners in distress. They are found to have taken with them from New-York to Liverpool, and back again from Liverpool to New-York, their marks of abuse obtained in *Impressment Society's* trainings. The *Times* is surely welcome to all the

influence of sympathy for such seamen, which are a great grievance to American ships.

THE NAVAL COURT OF INQUIRY.—After a month's labor, the Court seems but just to have commenced its work. One case, it is reported, has been concluded, but the result is not made public. In the trial of this there were about forty witnesses, and counting travelling expenses, *duty* pay, &c., probably cost the government $10,000. There are about *one hundred and fifty* others to be tried at the same pro rata! Verily, such legislation will absorb surplus revenue.

NAVY DEPOT ON THE COAST OF GEORGIA.—According to the late Act of Congress, making an appropriation of two thousand dollars for the purchase of a site for a navy depot on Blythe Island, and for the erection of such buildings, and for such improvements as may be necessary for the repair of United States vessels of war, &c., a commission of experienced navy officers has been appointed by the Secretary of the Navy to examine and report upon the most suitable site which the island affords. We understand that the commission consists of Captain James McIntosh, Commander H. J. Hartstene, Lieut. J. M. Brooke, and Civil Engineer Calvin Brown, and that they have already entered upon their duties.

APPOINTMENTS.—Delavan Bloodgood, of Springville, New-York was confirmed as Assistant Surgeon of the Navy, vice Passed Assistant Surgeon, Elisha K. Kane, deceased.

George P. Turner, of Virginia, was confirmed as Second Lieutenant in the marine corps, and Allan Ramsey a Lieutenant in the marine corps, vice Youngblood, resigned.

John S. Cunningham, of South Carolina, purser in the navy.

PROMOTIONS, RESIGNATIONS, &c.—The following were confirmed as Captains of the navy:

Theodosius Bailey, vice Abbott, deceased.
Hugh Y. Purviance, vice Morris, deceased.
William F. Lynch, vice McKeever, deceased.
Henry W. Morris, vice Dalaney, deceased.
Francis B. Ellison, vice Bigler, resigned.

The following were confirmed as Commanders of the navy:

Alexander W. Pennock
George I. Emmons.
Edward Middleton.
Thomas J. Hunter.
Gustavus H. Scott.
David McDougall.
Charles F. McIntosh

The following were confirmed as Lieutenants of the navy:

De Grasse Livingston, vice McRae, deceased.
William E. Fitzhugh, vice Pennock, promoted.
Trevett Abbott, vice Morgan, deceased.
Benjamin P. Loyall, vice Emmons, promoted.
Charles H. Cushman, vice Rusk, resigned.
Oscar F. Stanton, vice Middleton, promoted.
William H. Cheever, vice Wilson, resigned.
Henry A. Adams, vice Oakley, resigned
George Brown, vice Eaton, deceased.
Charles E. Hawley, vice Bunley, resigned.
Bushrod B. Taylor, vice Fox, resigned.
William H. Ward, vice Young, resigned.
Robert L. May, vice Biddle, resigned.
John W. Dunnington, vice Parker, resigned.
Hudson M. Garland, vice Aby, deceased.
James W. Shirk, vice Day, deceased.
Jesse Taylor, vice Walker, deceased.
James G. Maxwell, vice Hunter, promoted.
Henry Erben, vice Scott, promoted
Francis F. Shepherd, vice Higgins, resigned.
Thomas P. Pelot, vice Heileman, resigned.
Edward P. McCrea, vice M. Dougal, promoted.
Edward C. Stockton, vice Fleming, dismissed.

DEATHS.—Passed Assitant Surgeon, ELISHA KENT KANE, U. S. N., Feb. 16th—Dr. KANE! His epitaph is written on the North Pole—ECCE HOMO!

Purser EDWARD FITZGERALD, U. S. N., Feb. 27th. He entered the navy in 1810, served with Perry on Lake Erie, and been at sea seventeen years. As officer, husband, father and gentleman—he was in every sphere a noble specimen of man.

Captain Thomas Petigru, late U. S. N., March 6th.

Capt. Joseph Smoot, U. S. N., March 13th.

Purser Thomas P. McBlair, U. S. N., on board the *Merrimac*, on the 4th Feb.

ORDERS.—NEW-YORK.—The *Niagara* and *Mississippi* are to be used in laying down the submarine telegraph, and are being put in readiness with dispatch.

BOSTON.—To fit the *Cumberland* for sea immediately.

PORTSMOUTH, VA.—To fit out the *Dale* and *Powhatan*. The *Merrimac* arrived here on the 15th inst.

The *Jamestown* flag-ship of the African squadron has been ordered home, and it is reported that the *Powhatan* will take her place, and that Capt. Thomas A. Connover will be the next Commodore of that squadron.

Commander William McBlair has been ordered to the *Dale*.

Capt. Josiah Watson, of the Marine Corps, has been detached from the receiving-ship *North Carolina*, and ordered to Portsmouth, N. H.

Lieut. Watson Smith has been ordered to the receiving ship at Philadelphia.

PACIFIC SQUADRON.—The *Independence* and *Cyane* remained at Panama on the 6th ult. Commodore Mervine has been ordered to dispatch another vessel to Jarvis Island, with a view to ascertaining the quantity of guano reported to be there, and the facilities of obtaining it.

BRAZIL SQUADRON.—The *St. Lawrence* sailed from Rio on the 15th of Jan., previous to which her officers interchanged courtesies with Don Pedro's officials, and everything passed off most agreeably.

EAST INDIES.—By last accounts, the ships of the squadron were awaiting orders from the United States, and everything remained quiet, the Chinese being fully satisfied with the Yankees.

THE COAST SURVEY.—There are on this service about seventy officers of the navy, with numerous small craft. The Nautilus, Bibb, Crawford, Bancroft, Gallatin, Corwin, Varina, Walker, Arago, Active, Ewing, and Vixen, are all making their marks in their season, which is now just beginning to open. During the winter the officers attached to this service are mostly occupied at the Coast Survey office, in Washington, where their work is transferred to charts, and already we may boast of the most perfect set of coast charts in the world. In our *wars* heretofore we only had for use charts of our own coast made by *foreigners!* Now we not only have charts of our coast, of our own making, but our surveying officers have made charts of the *bottom of the ocean.*

TOWBOATS FOR THE STRAITS OF MAGELLAN.—The Philadelphia *Bulletin* is advocating this as a worthy object of commerce. Boats properly adapted to the service would shorten the passage to the Pacific on an average of twenty-five days. The distance through the straits is only about 400 miles, which might be run by strong tow-boats in 48 hours.

PIRATES.—In view of the danger to which American commerce has been exposed for the past two years, from pirates infesting the Chinese seas, and the East Indian archipelago, the Boston Board of Trade has petitioned government for armed vessels that could pursue piratical craft into shallow water. One steam sloop of war, of not more than 12 feet draught of water, to the East India Squadron, would clear them all in short order.

THE

U. S. Nautical Magazine,

AND

NAVAL JOURNAL.

VOL. VI.] MAY, 1857. [No. 2.

THE BOAT ARMAMENT OF THE U. S. NAVY.

THE admirable system of Boat Armament of the United States Navy, which has been created under the immediate direction and supervision of Commander Dahlgren, is highly honorable to the service which this naval officer distinguishes with his rare genius. The Bureau of Ordnance deserves well of the country for the wisdom it has displayed in placing confidence in this officer, and affording him the requisite facilities for perfecting his originations and plans, the details of which have proved so efficient in their practical initiation. The general utility of Commander Dahlgren's system is everywhere acknowledged as complete.

From the latest edition of his work on the Boat Armament of the United States Navy, we extract the following concise history of its origin and development under his charge:

"When the war with Mexico commenced, the navy of the United States suddenly found itself called upon to act in a sphere almost foreign to its previous experience, and not only the least suitable to its means, but certainly the least te be preferred of all others in which a navy can be employed.

"The peaceful tenor of the national policy since the war of Independence, and our territorial isolation from the great nations of the world, had little occasion or necessity for collision with any of them; and when this had occurred, the wide ocean that lay between the shores of these States, and our antagonists for the time, naturally made that ocean the field where our small navy resorted for action. This, with its limited force, and the impracticability of operating with any effect upon the territory of the enemy, served to confine our vessels to the legitimate and more agreeable task of a naval force—ship met ship, and heavy cannon, wielded with skill by

some of the ablest seamen of that or any other day, decided the victory. Thus it was in the offensive operations against revolutionary France in 1798, and against England in 1812; and hence the entire attention of our young navy was, happily for its early vigor, engrossed by the first and highest purposes of its creation, and diverted from subordinate ends which could afford but scanty laurels.

"But when the war with Mexico began, that power being destitute of a sea-force, our navy had no alternative but to proceed by the usual mode of blockade and coast warfare, for which it was so little prepared that the means were necessarily to be improvised. Our lightest sloops of war had too much draught to venture in the shoal water that bordered the hostile shores, or to pass the sand-bars that blocked the channel-ways of the rivers, while the absence of even a semblance of an armament for boats was too apparent. A few old iron carronades, and some specimens of the antique mortar-howitzers were to be seen about the yards, and occasionally they found their way afloat. But not a shell was provided for them, and shrapnel were unknown to the service as a part of the equipment.

"The navy was not slow in finding a remedy. Light vessels, purchased from the coasting-trade, were armed as well as possible, and everything that was at hand, in the way of light artillery, was put in requisition for the boats. Field 6-pdrs., 12-pdrs., and mountain-howitzers from the land service, with the iron carronades, and a few old 4 2-5 inch howitzers that were hunted up in the store-houses of the yards, furnished something to begin with—and however heterogenous the medley, it is due to all concerned to say that the immediate purpose was well met. The Mexican coasts, Atlantic and Pacific, were so completely lined with cruisers, that no privateer could issue thence to annoy our commerce, whose canvas whitened every sea. Our sailors were found, at Tabasco and Tampico, co-operating ashore in the general cause as well as the case admitted. And on the Pacific coast, the conquest of a large territory by the naval forces stood by itself unrivalled, the only instance of the kind, and more than compensated for the absence of other opportunities of distinction.

"There was an imperative necessity, however, for providing more fully against the recurrence of such an emergency; and having then quite recently found myself in charge of the Ordnance duty at the Washington navy-yard, I presented to Commodore Warrington, Chief of the Bureau of Ordnance, a proposition for erecting a suitable system of armament for boats. This was received favorably by that distinguished veteran, and with rather scanty means I proceeded from one step to another, until the present system was completed.

"The disadvantages of limited resources and experience were, however, fully compensated by the untrammeled use of those resources, and the

hearty support I received from the Chief of the Bureau of Ordnance. If there were no reliable antecedents to follow, neither were there any of an opposite character to avoid. The field was open for full investigation.

"The initial step was made in the autumn of 1848, with a little piece somewhat larger than a mountain-howitzer. But it was not until June, 1849, that I was able to furnish the first piece for service to the U. S. ship *John Adams*, then fitting under Captain Powell for the coast of Africa.

"Since that, the means at my disposal have increased. A regularly organized Department has grown up from the germ of 1848, and a fine building, (250 ft. in length, completed and occupied in May, 1854,) affords ample space for the increased quantity of machinery, with the steam power that drives it, and separate rooms for the fitting of shell, shrapnel, &c. I have also but recently completed and put into operation a foundry for bronze howitzers, in which several pieces have already been cast, and the results removed all doubts as to the successful operation of the furnace, which works well. It is capable of containing ten thousand pounds of metal in fusion.

"The foundry is at one end of the principal building, the laboratory at the other, forming three sides of a square; and the entire process, from the raw material to the complete arm in action, may be witnessed in passing from one division to another of the establishment. The casting of the howitzer—the quality of its metal, as shown by the combination of the constituents; the tensile strength per square inch, specific gravity, &c.; the boring, turning, and finishing of the howitzer; the construction of the carriages for the boat and the field; the casting of the projectiles; their inspection; manufacture of the fuzes; the fitting of the canister, shrapnel, and shells; the drilling of the Ordnance seamen; and lastly, the practice with shrapnel, &c., from the howitzer in the launch on the river, or on its field-carriage ashore.

"A considerable number of boat-howitzers have been issued for service; some have even been mounted in vessels intended for distant surveying service, where the proper batteries were not needed, and the space they occupied was wanted for other purposes. The *Vincennes*, steamer *Hancock*, *Porpoise*, *Kennedy*, steamer *Water-Witch*, had each a 24-pdr. howitzer pivoted on the forecastle, and two 12-pdr. howitzers (750 lbs.) on the quarter-deck.

"These, however, were only designed to make signals, and to alarm the savages who might be troublesome in the course of the wor[illegible] as suitable for offensive purposes in which even vessels of [illegible] ight be engaged.

"I shall not attempt to institute any com[illegible] ystem of boat-armament designed by myself and [illegible]

"The latter is duly represented in this Department by a number of its best pieces, which I have collected from different quarters of the general service, and it may be said emphatically that they have great historic interest, of no recent date, either, as there are among them two or three of the old 4 2-5 inch mortar-howitzers used as far back as the Tripolitan war.

"One little piece, in particular, is noteworthy, being that which was used so injuriously against the seamen of the U. S. Frigate *Savannah*, who, during the war with Mexico, were landed to relieve an interior post in California, then in some danger. Its weight is about 156 lbs., and that of the ball 2½ lbs.

"It is a rough casting, without any exterior finish, swollen at the breech by the action of the charge, and altogether such a petty, miserable looking piece, as to seem utterly contemptible; and yet it figured in several affairs, (for the want of better,) was captured with other compeers at Angels, by Commodore Stockton, and finally found its way to the U. S. ship *Cyane*, where it was made to do service against its former owners. To such inferior military means were both parties compelled to resort in contesting the possession of the distant and nearly uninhabited region that now teems with labor and gold.

"It may be noted, however, of the system about to be described, that the weights of its pieces are fully as great as the boats of the navy are capable of carrying—that the capacity of this weight is developed conformably to the most commonly received opinions upon the subject, and that the power of each piece is quite as great with reference to its peculiar object as the weight of metal employed admits of—the projectiles being shell, shrapnel, and canister.

"The boat-carriage allows the howitzer to be pointed wherever it can be fired without injury to the crew, the boat preserving its onward course; while with the ordinary carriage, the piece can be trained very little from the direct line ahead, and to fire a-beam or abaft the beam, it is necessary to bring the boat around.

"As a consequence, a boat may, with one arrangement, use her powers of speed and offense, or defense, to the full advantage of both; while with the other it is impossible, and one must be sacrificed more or less to the other.

"The field-carriage is but half the weight of that used in the army for corresponding pieces. It is readily stowed in the same boat with its howitzer and the boat-carriage,—can be got out of the boat in debarking wherever such an operation is possible, and is drawn with ease by hand.

"The strength and working of the carriages, and all the appliances, have been and are still constantly subjected to the tests of practice at this place, by firing on the boat and field-carriages, evolutions on the water,

and debarking along the shores of the river, to an extent which rarely falls within the opportunities of ships in general service.

"The inapplicability of the artillery borrowed from the land service, to naval purposes, was obvious in the Mexican war; and Commodore Perry, who was most actively engaged along the Gulf-coast, had occasion at the time to urge this upon the attention of the Bureau. The squadron employed under his command, in the recent expedition to Japan, was supplied with twelve of the present boat-howitzers; they are said to have been handled with admirable exactness and celerity, and some of them generally attended the debarking parties from the ships. The able Commander of the expedition had thus an occasion to contrast the operations of the new boat-howitzers with those of the pieces he had previously been obliged to use in the Mexican war, and it is gratifying to know that he can bear witness to the utility of the change.

"It was reasonable to expect that the trying ordeal of service would disclose many imperfections in a system made up of so many details; but the examination of a number of howitzers and their carriages that have been returned here after long service at sea, afford no reason for departing from the principle or material of construction first adopted, except in the substitution of composition for the iron fastenings of the boat-carriage; for the latter readily rust, which interferes with the use of the carriage, and injures the wood when in contact with it.

"In prosecuting the work it was my good fortune to enjoy the full confidence of the Chief of the Bureau of Ordnance, Commodore Warrington. This gallant veteran is now no more. After faithful and distinguished services, commencing at Tripoli, some half a century since, he was called away in the vigor of mind and body.

"No man ever possessed the attributes of a brave and high-minded officer in a greater degree; always clear, prompt, and resolute, he was not less successsul in administering the Ordnance affairs of the Navy than as a commander in battle. To the end of his long career he trod the path of usefulness and honor in the service of his country.

"My thanks are due to Captain de Brettes, of the Polytechnic School, Paris, for the trouble he may have experienced in giving the 'Memorandum' the translation into his own language, which has recently been published in Paris."

The following regulations for furnishing boat-guns and field-pieces to vessels of the Navy were prescribed by the Department, Dec. 17, 1850:

All boat-guns and field-pieces are to be of bronze, of howitzer form, and are to be chambered.

They are to be of 12 pdr. and 24 pdr. calibre; are to weigh not more than 450 and 750 lbs. for the 12 pdrs., and 1200 lbs. for the 24 pdrs.

Ships of the line and frigates are to have one boat-gun of 24 pdr. calibre, and one field-piece of 12 pdr. calibre, with a suitable carriage for each.

The guns will be made after plans approved by the Bureau of Ordnance, and prepared with its sanction under the superintendence of Lieut. Dahlgren, upon whose plan all the necessary carriages will be made.

For each 12 pdr. for the above-mentioned classes, there shall also be a boat-carriage prepared, by which a field-piece and a boat-gun, or two boat-guns, as may be found necessary by the nature of the service, may be used.

Vessels below the class of a frigate, and of not less rate than a second-class sloop of war, shall each have a boat-gun, which is to be a 12 pdr. mounted complete for boat service.

Hereafter it may be deemed proper to extend the allowance of boat-guns to the smallest class of sloops of war, and field-pieces to first class sloops; but that will, in a measure, depend upon the facility with which they can be prepared, and the service on which they may be expected to be engaged.

Commander Dahlgreen thus describes the weight, calibre, and construction of the United States boat howitzers:—

"The classes of howitzers necessarily vary, the weights being determined by the capacity of the boat at the bow and stern, where it is the invariable practice to carry and use light artillery.

"The launch, being the largest and strongest of the ship's boats, is therefore appropriated to the carrying of the heaviest of the light artillery, as well as to many other services in which size and strength are most needed. None of these purposes is more important than that now in view, as it measures the offensive power of a ship beyond the reach of her heavy ordnance. It is therefore of consequence that in designing launches this object should be strictly borne in mind.

"Fine lines may conduce to appearance or to greater speed, but they lessen the buoyancy forward, and circumscribe the space within the gunwale; hence the piece proper to the size of the launch cannot be borne or handled efficiently, and a very material advantage is abandoned unnecessarily.

"A launch should always have sufficient fullness at the water-line of the bows, so as to afford the buoyancy required to sustain its appropriate gun, and such a form of gunwale as will permit the muzzle of the piece to look well over it around the entire sweep, thus avoiding the liability of having the bow shattered or set on fire by the explosion.

"For the same reason, the ordinary projection of the stem above the

gunwale is to be entirely suppressed, and the sheer of the lines forward also, using the temporary washboard, if needed, to keep dry in a sea-way.

"In cutters, the stem and the sheer may also be made to conform to the convenience of the guns which they are to carry, and the heaviest of such boats should have the bow to approach in fullness that of the launch, rather than the acuteness of the smaller and swifter cutters.

"Faults of the kind above mentioned are noticeable in the launches of some of our recently constructed ships, which are, in this way, liable to a material diminution of power where expeditions are concerned, because they are unable to carry a proper gun, or else to use it efficiently.

"It is well ascertained that the launches of frigates and the heavier ships, are fully cepable of carrying, forward or aft, pieces as heavy as will be required for any service to which the boats are likely to be applied.

"The launch of a line of battle ships, for instance, would bear, without difficulty, a piece of 2000 lbs., which amount of metal would construct a 32 pdr. howitzer. But as this class of ships is rarely commissioned in our navy, and a piece so heavy would be too burdensome for the boats of any other ship, it seemed injudicious to divert the operations of a new and limited establishment from the fabrication of pieces required daily to supply the current demands of the classes of vessels most generally used.

"A 24 pdr. howitzer, of about 1300 lbs., was therefore adopted for the heaviest class, as more suitable to the immediate and pressing wants of the navy, as it could be carried by a frigate's launch, if any occasion should require the exhibition of much force in boat expeditions, while it would be no insignificant piece for the launch of a 74, when the necessities of service should cause a ship of that class to be commissioned.

"The howitzer, specially designed for the frigate's launch, is the 12 pdr. of 750 pounds, a piece which, in all probability, combines efficiency and mobility in a higher degree, for boat operations, than any other, and there is little doubt that the experience of active service will confirm this opinion of its merits.

"The launch of a sloop of war could hardly be expected to sustain the 12 pdr. of 750 lbs. with any convenience. Hence the necessity of a lighter piece that would suit the launches of the least of that class of ships, there being no less than three rates of them. For this purpose, the 12 pdr. howitzer of 430 lbs. is intended.

"Hence results the following arrangement:

	Launches.	*Cutters.*	
24 pdr. howitzer	74's	———	———
Medium 12 p r. howitzer	Frigates	74's, 1st	———
Light 12 pdr. howitzer	Sloop of war's	Frigates 1st	74's 2d."

Further extracts from the valuable little work of Commander Dahlgren will be given in a future number.

SILVER'S MARINE GOVERNOR.

MESSRS. EDITORS:—When a Marine Engineer is first applied to for his opinion of the necessity for a governor to the marine engine, he naturally looks upon it in the same light that he would if for a stationary engine, where it is employed to equalise the slight deviations from a uniform velocity, consequent upon the stopping and starting of different machines, and the also slight fluctuations in the supplies of steam, it being important, in most manufactories, that a uniform velocity of the different machines, &c., should obtain.

Taking this view of the subject, he immediately says it is not required on ship-board, as the engine is the only machine driven, and there is no objection to the departures from a uniform velocity, consequent upon unequal firing, when the fires receive the attention required for an economical combustion of the fuel. And again, when it is suggested that they might perhaps be useful to prevent the "racing" to which the engine is sometimes subject, he calls to mind the manner in which it effects its purpose in the stationary engine, and replies, without hesitation, that no governor can act with sufficient promptness and power to prevent the difficulty. He will acknowledge, however, that if this could be accomplished it would be a great desideratum.

It would very naturally be expected by those not familiar with ocean steam navigation, that any rolling or pitching of the vessel, or any roughness of the sea, would occasion an unequal motion and velocity of the engine. This, however, requires some explanation. Engines do not race in *all* kinds of rough weather. With the paddle-wheel, if the vessel rolls, one wheel is rolled out and the other is rolled in. The resistance, therefore, which is removed from one, is added to the other, and the engine is not affected. With the screw, rolling can of course have no effect. Again, if the vessel is in a heavy head sea, so as to bring the paddle-wheels between two waves which are supporting the ends, or in the case of the screw being lifted out of water by a wave under the middle of the ship, there is not time for the momentum of the engines to be overcome sufficiently for the engines to acquire a great increase of velocity before the paddles or screw are again submerged, because the vessel is going in one direction and the waves in another.

It is when the sea is running in the same, or nearly the same direction with the ship, that the difficulty is experienced. For instance, if a steamer is going head to the sea at the rate of ten knots an hour, and the waves are rolling at the rate of fifteen knots, she meets and passes them with a speed of twenty-five miles an hour; while if she was running before the wind,

at the same rate, they would pass her with a speed of five miles an hour. The wheels or screw would therefore remain out of water five times as long in the latter case as in the former, and the faster the vessel the greater would be the difference. In practice it requires but a moderate following sea to seriously disturb the motion of the engines, and when scudding in a gale of wind it is necessary for the engineer to stand with his hand on the throttle-valve constantly, shutting it when the wheels or screws are out of water, and opening it again when they go to the opposite extreme of being deeply submerged; and even when he gives it his undivided attention, it is not safe for him to open it to its fullest extent, for fear the engines will run away from him. This is just the time, too, that speed is necessary to the safety of a vessel, the ability of a ship to scud being in direct proportion to the velocity she can maintain. Moreover, it is at such a time that the engineer has the least leisure to attend to the throttle-valve. Any appendage, therefore, which will permit the full power of the steam to be applied to the engines without danger to them, under circumstances where without it one-half the power gives them the greatest strains to which they are ever subject, must recommend itself strongly to owners and insurers, as well as to the engineers themselves.

There have been two difficulties in the way of applying the governor to the marine engine. The first was connected with the rolling and pitching motion of the vessel as supporter of the governor. The second was the difficulty of obtaining sufficient positive power, resulting from a change of velocity, to act with promptness upon the throttle-valve.

In order to exhibit clearly the first difficulty, it will be necessary to make a few remarks upon governors in general.

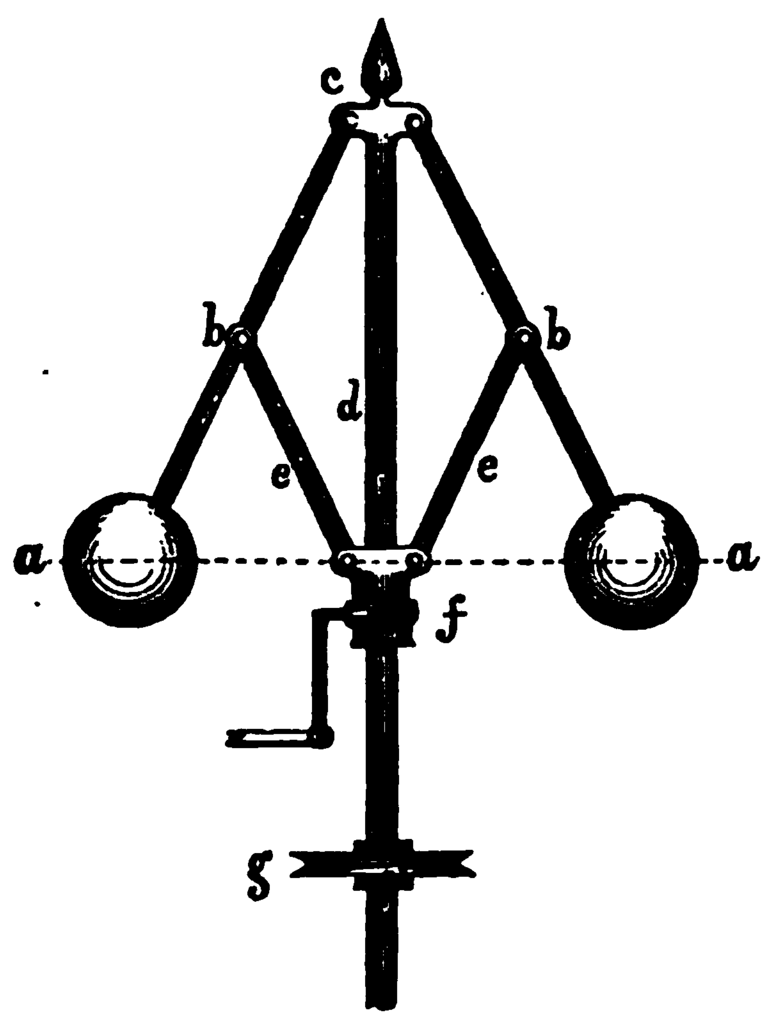


Fig. 1.

Fig. 1 represents the ordinary governor applied to stationary engines, *a*, *a*, being the balls suspended by the arms, *b*, *b*, jointed at *c*, to the upper end of the spindle, *d*. The rods, *e*, *e*, connect the arms, *b*, *b*, to the movable sleeve, *f*, which acts upon the throttle-valve. The whole is driven by the means of a gear, or band wheel, *g*, being connected with the engine shaft. In this governor the centrifugal force created by the revolution of the balls, and tending to throw them outward from the spindle, *d*, is counteracted by their gravity, with any given speed. Therefore they will assume a dis from the spindle, where the two exactly counterbalance each other

increase in the speed will cause them to move outward until the equilibrium is again restored. That it is important that the spindle, *d*, should be vertical and stationary, will appear from the following considerations:

The dotted line, *a*, *a*, gives us the centre of gravity of the balls, in its intersection with the centre of the spindle, *d*. As this is below the point of support, *c*, an inversion of the spindle would cause this line, (*a*, *a*,) to approach the point of support; in other words, would cause the balls to fall *from* the spindle, *d*, and if the spindle was horizontal, the centre of gravity would be on the same level with the point of support in all the positions in which the balls could be placed. They would therefore remain in any position while not revolving. As soon, however, as they commenced to revolve, there being nothing to resist the centrifugal force, they would immediately assume the greatest distance from the spindle allowed by the instrument, and as any inclination from the vertical would be an approach to this position, the force of gravity would decrease with the amount of the inclination, while the centrifugal force would remain constant, the consequence being that the balls would recede from the spindle, and raise the sleeve, *f*, as the spindle inclined, although the speed would remain uniform. If, therefore, this governor was placed in a ship, a roll of the vessel would have the same effect as an increase in the speed.

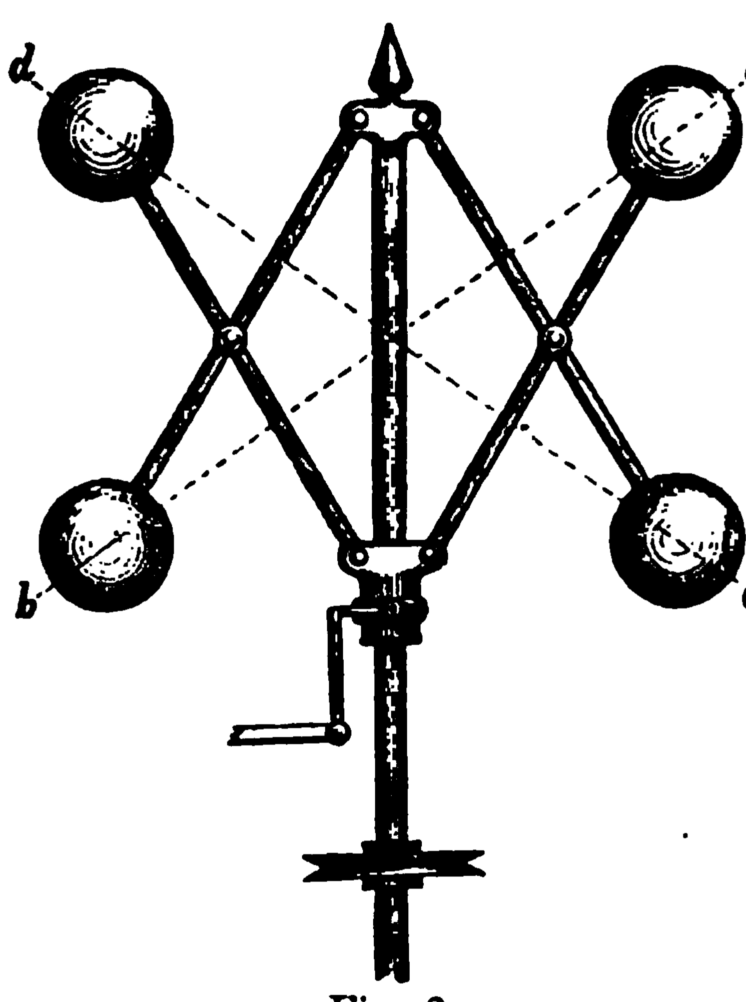


Fig. 2.

Fig. 2 represents the arrangement of Mr. Brunel, the celebrated English engineer, which he appears to have expected would overcome the difficulty. To prove that he was mistaken, it is only necessary to draw attention to the fact that the centre of gravity of the balls, found at the intersection of the lines, *a*, *b*, *c*, *d*, falls below the point of support. The same reasoning which applies to the ordinary governor may therefore be brought to bear with equal force against this, as being unsuitable for marine purposes.

An arrangement which at the first view would appear to overcome the difficulty, is to have a small balance-wheel attached to the spindle with a joint, so that it may stand obliquely to it when in a state of rest, and be brought more nearly at right angles with it when in rapid motion, by the centrifugal force. Experience in this direction, however, teaches us that although this will do for a stationary spindle in any position in which it may be placed, it will not do with a movable one;

because when matter is in rapid revolution, in any one plane, it requires considerable force to change the position of the plane of revolution, and the only force which can be brought to bear in this case is the resistance to movement of the movable sleeve. Change of position with this will therefore affect the throttle, as well as change of velocity.

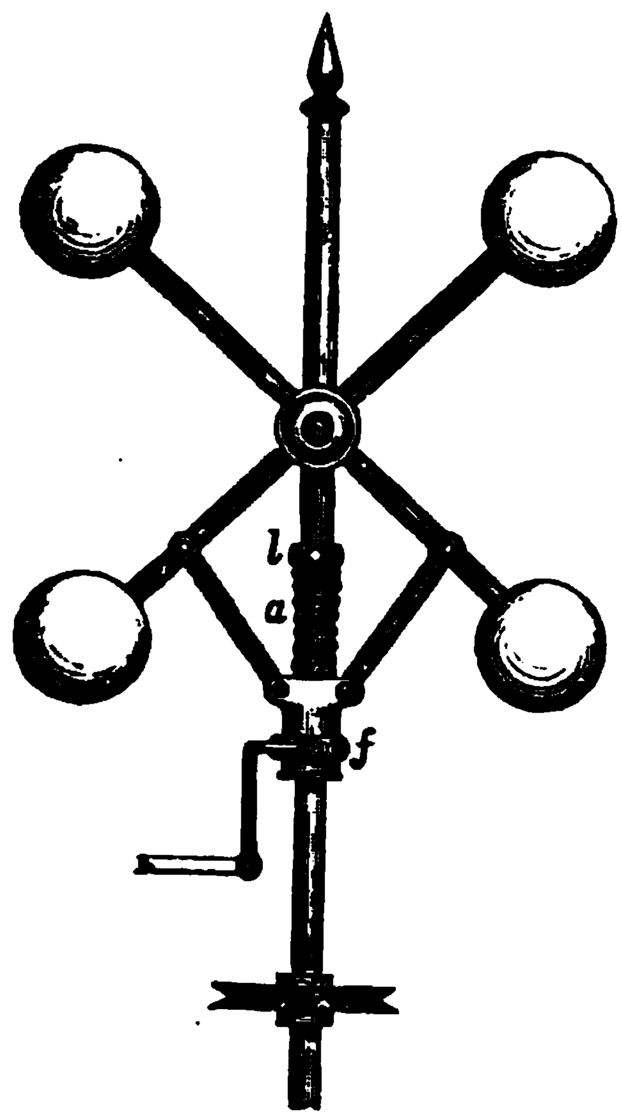


Fig. 3.

Fig. 3 shows the arrangement which overcomes both the difficulty of a departure from a vertical position, and that experienced from the movements of the vessel. It will be seen by reference to the sketch that the centre of gravity is always at the centre of support; the centrifugal force is therefore opposed entirely by the spring, *a*, which acts with equal force in all positions. The position of the balls at any fixed number of revolutions can be regulated by compressing the spring more or less with the collar, and set screw, *b*. Here we have, then, all that is required to produce a movement of the sliding sleeve, *f*, on the spindle, which shall be governed entirely by the velocity, without regard to the movements of the vessel.

We now come to the second difficulty. If direct connection was made between this and the throttle-valve, it would require enormously heavy balls, driven at a high speed, to move the valves of our large ocean steamers. Besides, if this is overcome by the application of an easily-worked valve, it must be borne in mind that a marine governor is not required for the purpose of slightly closing and opening the throttle, consequent upon a slight change in the amount of work, or supply of steam, as in the stationary engine; but to close, or nearly close it, when the engine is relieved of its resistance, and this must be done with but a slight increase in the velocity, while with a direct connection of the governor and throttle, if the paddles or screw were hoisted out of water, the valve would only be kept closed while the engines should continue to maintain a high velocity; for as soon as the speed is reduced to the ordinary standard, the governor opens the valve, so that the final result is, that the engine would run much faster when the wheels or screw were out of water than at other times. This would therefore only partially remedy the evil. What is required is that as soon as the engine *commences* to run faster than the ordinary limit, the throttle shall be wholly or nearly closed, and shall remain so until the engine shall commence to run slower than the ordinary limit. The result of this will be that the wheels or screw will meet the first shock of the deeep immersion,

which always follows the hoisting out, with a low velocity, and as the pressure of steam is admitted to the piston *after* the immersion, the strain are brought easily and fairly upon the machinery. This is effected by the application of a small steam cylinder, which acts upon the throttle valve arm, the governor being connected with the valve of this small cylinder, in such a way that the spreading of the balls beyond the limit of their position at ordinary speeds shall move the small valve, and admit steam to one end of the small cylinder, the piston of which, acting on the throttle valve arm, closes it. When the engine commences to run slower than ordinary, the depression of the balls admits steam to the other side of the small piston, and the valve is opened. When running, however, at the usual speed, both ports are covered by the small valve, and there is no connection between governor and throttle. This small valve is made to lap sufficiently to permit a limited range of speed without admitting steam to the cylinder.

In practice the result has been admirable, the great feature being that it acts promptly, and with sufficient force to do immediately what does not require doing at all if there is any delay.

The application of the steam cylinder was made by Mr. Horatio Allen, of the Novelty Iron Works, and the first vessel to which it was thus applied was the Collins' steamer *Atlantic*. It has since, however, been applied to several ocean steamers, where it is looked upon by the engineers as a labor-saving machine, relieving them of the most fatiguing and unpleasant labor they had to perform. A. C. S.

EXPERIMENTS ON IRON TARGETS.

Some experiments have been made at Woolwich to test the power of resistance of timber lined with 4-inch iron plates, the combined materials being of the same thickness as the immense floating batteries constructed during the late war; and also to test the durability and quality of iron plates manufactured by rolling, as compared with iron turned out by the hammer. The target was an immense construction of timber, lined with 4-inch plates of iron of both descriptions, and the total weight was 30 tons.

This target was placed on a foundation constructed for the purpose, and 24 rounds of 68-pounders were fired, with the following results :—The first 14 rounds were fired at a distance of 600 yards, and after the first few rounds the timber-work gave way in several directions. The last 10 rounds were fired at a distance of 400 yards, and the work of destruction commenced was now consummated. The timber-work of the target was com-

pletely broken and splintered, and the plates of iron made by the rolling-process were cut up and split, having apparently but little adhesion. The iron plates which had been made by the old process resisted the solid wrought iron shot much more successfully, and it was apparent that these plates possessed more adhesive power than the rolled plates. Such was the tremendous force of the cannonade that the immense target was forced, by the concussion, several feet from the foundation or box on which it was placed. The last shot fired was the most effective. This shot went completely through the target, timber-work and iron included. It was the subject of remark by several practical men that the principle of combining timber with iron plates was no doubt the best that could be at present adopted; but it was evident from these experiments that such plates must be improved upon before they could resist the concussion of repeated discharges of heavy shot.—*London Mining Journal.*

DR. KANE'S ARCTIC EXPLORATIONS.

THE expedition, under the command of Dr. Kane, sailed from New-York on the 30th of May, 1853. It consisted of eighteen chosen men, besides the commander, embarked in a small brig of 144 tons burden, named the *Advance*, which was furnished by Mr. Grinnell, other expenses being contributed by Mr. Peabody and several generous individuals and societies.* Dr. Kane's predetermined course was to enter the strait discovered the previous year by Captain Inglefield, at the top of Baffin Bay, and to push as far northward through it as practicable. He engaged the services of a native Esquimaux, of the name of Hans Christensen, at Fiskernaes, and then crossed Melville Bay, in the wake of the vast icebergs with which the sea is there strewn. These huge frozen masses are often driven one way by a deep current, while the floes are drifted in another by winds and surface-streams, disruptions being thus necessarily caused in the vast ice-fields. The Doctor's tactics were to dodge about in the rear of these floating ice-mountains, holding upon them whenever adverse winds were troublesome, and pressing forward whenever an opportunity occurred. This plan was so skillfully and pertinaciously followed that by the 28th of August the brig was lodged in a small bay on the eastern coast of Smith's Strait, some forty or fifty miles byond Captain Inglefield's furthest position. There the *Advance* became untrue to the prestige of her name, for

**Arctic Explorations. The Second Grinnell Expedition in Search of Sir John Franklin;* 1853 *to* 1855. By Elisha Kent Kane, M.D., U.S.N. Philadelphia: Childs & Peterson

having been snugly placed in the midst of a cluster of islands, she turned into a fixture, and obstinately refused to budge another inch. Where she was berthed in the September of 1853 she now remains.

On the 10th of September the thermometer was down to 14° of Farenheit's scale, and all the fragmentary floes and ice masses were so cemented together by young ice that the men could walk and sledge any where round the ship. It had therefore become obvious to all concerned, that there remained nothing else to be done but to make the best preparations for the winter that were possible in the circumstances. The hold was unstowed, a storehouse was prepared on one of the islands close by, and a snug deck-house was built over the cabin. A dog-house was also constructed, for the accommodation of nine Newfoundland and thirty-five Esquimaux dogs, which formed the Quadrupedal element of the expedition. Upon another island an observatory was erected, a very ingenious plan being adopted for the preparation of an extemporaneous adamant to serve as the piers of the astronomical instruments. Gravel and ice were well rammed down into empty pemmican casks, and there left to be consolidated by the intensity of the cold. They were soon transmuted into a material as free from tremor as the densest rock.

On the 20th of September seven men were sent out with a sledge to deposit a store of provisions in advance, in preparation for an exploring-party that was in progress of organization. The party was out 28 days, and succeeded in placing 800 pounds of provision in *cache* a hundred miles towards the north, near the debouchure of a huge glacier, which was discovered shooting out from the Greenland coast over an extent of thirty miles. This was within the eightieth parallel of latitude.

While the advanced party were absent upon this duty, the commander seized the opportunity to endeavor to rid the brig of a troublesome colony of rats, which had attached themselves to the explorers' fortunes. Three charcoal fires were lit in the fore-peak, and the hatches and bulk-heads hermetically closed. The Doctor soon after detected a suspicious odor; and upon looking into the cause, found a square yard of the inner deck one mass of glowing fire, which was extinguished only after great exertion and risk from the mephitic vapor. The result of the experiment was the dead bodies of 28 rats. Before he escaped from his Arctic quarters, however, he had learned to be less prodigal of rat-life. Once, upon a more recent occasion, when starting upon a sledge journey with a companion, he recorded that he had added to the stores, for his own especial consumption, a luxury which consisted of "a few rats, chopped up and frozen into a tallow ball."

Direct sunlight visited the deck of the brig for the first time on the last day of February, after an absence of 140 days. The earliest trace of dawn-

ing twilight was seen as a fleeting dash of orange tint on the southern horizon on the 21st of January. Dr. Kane climbed a lofty crag to catch sight of the returning sun on the 21st of February, and describes his nestling there a few minutes in the sunshine as like "bathing in perfumed water." The mean temperature of the month of February in this high lattitude of 78° 37′, the most northern station in which any bod yof civilized men ever wintered, was 67° degrees below zero. The thermometer occasionally stood 102° below freezing. The mean temperature of the year was 2° lower than that of Sir Edward Parry's winter station at Melville Island. The shores and islands were hemmed in, in the spring, by a continuous ice-belt 27 feet thick and 120 feet wide. In sheltered positions, freezing was never intermitted for a single instant throughout the year, and snow was falling on the 21st of June.

During the winter's residence in this severe climate, the interests of science were not overlooked. Besides such observations of the heavenly bodies as were essential for the exact determination of the position of the observatory, a continued series of magnetic observations was made and registered. The Doctor gives a very graphic description of the proceedings on what he calls the magnetic "term-days." A fur-muffled observer sat upon a box on those momentous days, with a chronometer in his bare hand, and with his eye fixed to a small telescope, noting the position of a fine needle upon a divided arc every six minutes, and registering the observation in a note-book; the process being carried on uninterruptedly by two sets of eyes for twenty-four hours at a stretch.

On the 19th of March, continuous day having set in, a traveling-party was sent off to increase the deposits of provision at the advanced cache. On the 31st three of the party returned, swollen, haggard, and hardly able to speak. The utmost they had been able to accomplish was the deposit of their burden some fifty miles away from the ship. They had been enveloped in almost impenetrable snow drifts, and four of their companions were now lying frozen and disabled *among the drifting hummocks somewhere* to the north-east, with one attendant in better plight to look after them. Almost on the instant, a sledge was prepared, and the strongest of the three broken-down men who had returned was wrapped in dog-skins and furs, and strapped upon it, in the hope that he might be able to render some service as a guide. The gallant chief of the adventurous band, with nine of his fresh men, then harnessed themselves to the sledge, and started off to the rescue, with a tent and food for the disabled sufferers, but carrying nothing else with them, saving the clothes their backs. The thermometer indicated a temperature of 78° belo After sixteen hours' incessant travel, it became evident tha party had lost their way among the hummocks. The guid sledge had

fallen asleep from exhaustion, and when they attempted to wake him up they found that he was in a state of mental derangement, and quite unconscious of what was said to him. In this dilemma the tent and provisions were deposited upon the ice, and the party dispersed upon the wide floe with the hope that they might providentially strike the trail of the missing band. The poor fellows were here soon seized with trembling fits and short breathing, and almost inadvertently clung to each other. Their brave leader fainted twice upon the snow. They had been eighteen hours out without food or drink, when the Esquimaux, Hans, stumbled upon what seemed, to his acute senses, a nearly effaced sledge-track. The clue was followed up into deep snow, in a wilderness of hummocks, until at length a small American flag was descried fluttering from a hummock, and near to this, the top of a tent almost buried in the snow-drift. This proved to be the camp of the disabled men. It was reached after an uninterrupted journey of twenty-one hours. The four poor fellows, stretched upon their backs within the tent, repaid the brave man who had come to their rescue with a hearty cheer the instant he appeared, to which was added the assurance that they were "expecting him, for they were sure he would come." After a short rest, a bundle of skins was fixed on the sledge for the disabled men, and the return-journey was commenced. The sledge was top-heavy with its living load, and the maimed men could not bear to be tightly lashed upon their bed. Everything was left behind excepting the coverings necessary for the men; still the load on the sledge amounted altogether to 1100 pounds. When still nine miles away from the tent and food which had been left on the ice as they went out, the entire party began to show signs of failing energy; the stoutest of the men sank down on the snow-drift, and declared they must sleep. The tent was therefore pitched, and the party left to snatch four hours' repose; while the Doctor, with one companion, pushed on to get some hot refreshment ready in the further tent, against the arrival of the rest of their companions. They reached it after four hours' further march, but quite unconscious of what they were doing. All they could afterwards remember was, that they saw a bear moving leisurely just ahead of them, and tearing down the tent before they came up. Almost instinctively they set the tent up, crawled into their reindeer bags, and slept three hours. When they awoke, the Doctor's companion had to separate him from his buffalo-skin by cutting away the beard, which was frozen hard to the fur. The backward party arrived after some hours' delay, to find a mess of hot soup ready for them. As soon as this was swallowed the sledge was repacked, and the painful progress renewed. At length the men who were tracking the sledge had to halt every few minutes, and fall down sleeping on the snow. The party finally reached the brig, quite delirious, and devoid of all consciousness of

their actions. Their foot-tracks subsequently showed that, under the strong instinct of self-preservation, they had travelled quite in a bee-line to the ship. Their delirium proved to be only the consequence of exhaustion, and soon yielded to the influence of generous diet and rest. One of the party suffered from blindness for some time; two had to undergo amputation of portions of their feet; two died in consequence of the exposure. The rescue-party was out seventy-two hours, and travelled between eighty and ninety miles, halting only eight hours out of the seventy-two. Such was a veritable incident in the Arctic experience of Dr. Kane.

Notwithstanding the untoward isssue of this pioneer excursion, the intrepid explorer was off with a sledge and seven men on the 26th of April, leaving four-able-bodied and six disabled men to keep the brig. His purpose was to proceed to the cache at the foot of the great glacier, load up there with provisions, and then pass onwards along the face of the glacier, until an opportunity occurred to cross to the American side of the strait, and press on northward along the western coast. At the cache, however, the unwelcome discovery was made that the bears had been beforehand with the expedition, although the stores were covered by blocks of stone which it required the strength of three men to adjust. The iron casks that had contained the pemmican were broken literally into chips, and tin cases were penetrated by the brutes' claws as if they had been pasteboard. Near to the margin of the great glacier the attention of the party was forcibly arrested by a natural plinth and shaft of greenstone, together 760 ft. high, standing in the mouth of a magnificent gorge. To this remarkable column, thus reared by the hand of nature within a long day's railway journey of the earth's northern pivot, Dr. Kane at once attached the name of Mr. Tennyson—the grandeur of the wild solitude forcibly suggesting to the thoughts of the discoverer some of the characteristics of the poet's genius. At the rifled cache the strength of the leader broke down, and he had to be packed upon the sledge, and dragged by his comrades back to the brig, where he arrived on the 14th of May.

Subsequently to this, two other exploring expeditions were successively dispatched. The more successful of the two consisted of one of the party named Morton, and the Esquimaux lad Hans. They started with a dog-sledge on the 4th of June, passed along the ice-belt in front of the great glacier, and finally reached a bold cape close upon the eighty-first parallel of north latitude, which entirely barred all further progress. Having climbed some 480 feet high upon the rocks, Mr. Morton unfurled there the flag which Commodore Wilkes had planted on the antarctic continent in the extreme south. No land could be seen on the Greenland side beyond the promontory, but the opposite coast of the strait was distinctly visible for about fifty miles further to the north, ending in a bare truncated peak,

to which the name of Sir Edward Parry was given. With a horizon of about forty miles, not a single trace of ice was discoverable; and the ear of the discoverer, as he stood upon his lofty look-out, was gladdened by the noise of a heavy surf breaking among the rocks at his feet. Melted snow upon the rocks, crowds of marine birds, advanced vegetation, and a high range of the thermometer when immersed in the water, all indicated a far milder climate for the place than that which is experienced three degrees lower in Smith's Strait. This, then, constituted the grand geographical result of the exploration. Instead of the Bay of Baffin forming a *cul de sac*, as the old tradition of the whalers conceived, it leads to a strait —Smith's Strait—which passes on into a channel—Kennedy Channel— that apparently expands into an open polar sea, abounding with life, some 300 miles further to the north than the head of Baffin Bay. The shores of this channel, terminating in the Cape Constitution of Mr. Morton, in latitude 81° 22′ on the eastern side, and in Sir Edward Parry's peak, about latitude 82° 17′ on the western side, had now delineated and mapped through an extent of 960 miles, at a cost of 2000 miles of travel on foot and in sledges. Mr. Morton commenced his return on the 25th of June, and reached the ship on the 10th of July, staggering by the side of the limping dogs, one of which was riding as a passenger upon the sledge.

Dr. Kane next made an unsuccessful attempt to communicate with Beechey Island, by means of a whale-boat. Soon after his return it was obvious there would be no possibility of getting the ship liberated from the ice that season. The resolute commander, however, was determined that he would not leave her until he had tried the chances of another year. He consequently gave permission for any of his comrades that wished to make an attempt to escape. Eight of the party decided to remain with their commander, but the rest started southward an the 28th of August, with a liberal share of the general resources. On the 12th of December the seceders again presented themselves at the brig with fallen crests, having failed to force their way, and having been reduced for two months to subsist entirely on frozen seals and walrus meat, chiefly procured from the Etah Esquimaux.

To return, however, to the month of August. When the diminished party were abandoned by their comrades, they set to work in good earnest to make preparations for another long sunless winter. They had only 30 buckets of coal on hand; Dr. Kane therefore endeavored to follow the example set by the natives of the region, and convert the brig into an Esquimaux *igloe*. A small apartment was constructed amidships below, which could only be entered from the hold by a long narrow tunnel, or *tossut*. The walls and ceiling were thickly padded with frozen moss. In this close apartment the entire party had ultimately to endure all the wretch-

edness of scurvy, burning the ropes, spars, and finally the outer shell of the brig for fuel, and yet having to limit themselves to a consumption of eighty pounds per day. On the 14th of January, Dr. Kane congratulated himself that *in five more days* the mid-day sun would be only "*eight degrees below the horizon.*" On the 9th of February he wrote in his journal: "It is enough to solemnise men of more joyous temperament than ours has been for some months. We are contending at odds with angry forces close around us, without one agent or influence within 1800 miles whose sympathy is on our side." There were no star-observations this winter; the observatory had become the mausoleum of the two of the party who had succumbed after the excursion in the snow-drift. In the beginning of March every man on board was tainted with scurvy, and often not more than three were able to make exertion in behalf of the rest. On the 4th of the month, the last remnant of fresh meat was doled out, and the invalids began to sink rapidly. Their lives were only saved by the success of a forlorn-hope excursion of Hans to to the remote Esquimaux hunting-station, Etah, seventy-five miles away, whither he went in search of walrus. Wiith the return of the sun, the commander began to busy himself, first with attempts to recruit the store of fresh meat—a task in which he was mainly aided by a hunting-treaty he had concluded with the Esquimaux—and then with preparations for abandoning the ship. Two whale-boats were fixed upon sledges, and on the 17th of May the march was commenced, the men dragging each boat alternately, and making a progress of a mile and a half per day. The Doctor himself carried forward the necessaries for loading the boats, and brought up the sick men of the party, by the help of a small Esquimaux dog-team which he had managed to preserve, besides keeping up the supplies along the line of march. This team of already well-worn dogs carried the Doctor and a heavily-laden sledge backwards and forwards 800 miles during the first fortnight after the abandoning of the ship—a mean distance of fifty-seven miles per day.

The retreating-party were greatly cheered and aided in their labors by the countenance of their Esquimaux friends, who now brought them daily supplies of fresh birds, and occasionally took a share in the work. One man alone of the party was lost on the route. He died in consequence of a hurt experienced by accident. The whale-boats were finally launched into the water, and loaded, on the 18th of June, after an ice-portage of 81 miles, accomplished in 31 days. The boat parties then made their way, in the midst of great difficulties, and often through imminent peril. During 13 days they were beset in the dense pack-ice interposed between the north and south waters of Baffin Bay, and moving alternately over ice and through water. Twice they escaped destruction very narrowly, by taking refuge from gales, on cliffs that were providentially covered with

grass, and multitudes of the breeding-eider duck. Upon one of these occasions the men gathered 1200 eggs per day. On the 6th of August, the party finally reached the Danish settlement of Upernavik, after a prolonged voyage of fifty-two days. Five weeks subsequently they were all safely received on board the United States vessels *Release* and *Arctic*, which had been prosecuting a search for the missing party, about the head of Baffin Bay since the beginning of July.

Dr. Kane's volumes are illustrated by more than 300 engravings and wood-cuts made from his own sketches Some of the engravings express the peculiar characteristics of high arctic latitudes very beautifully. The book itself is above all common praise, on account of the simple, manly, unaffected style in which the narrative of arduous enterprise and firm endurance is told. It is obviously a faithful record of occurrences, made by a man who was quite aware that what he had to tell needed no extraneous embellishment. There is, however, so much artistic order in the mind of the narrator, that the unvarnished record has naturally shaped itself into a work of distinguished excellence upon literary grounds. The scenes which it describes are so vividly and vigorously brought before the reader that there are few who sit down to the perusal of the narrative but will fancy, before they rise from the engrossing occupation, their own flesh paralysed by the cold 100° greater than frost, and their blood scurvy-filled by the four months' sunlessness. It is only just also to remark that there is unmistakable evidence in the pages of this interesting book that the Doctor was no less eminently gifted for the duties of his command than he has been happy in his relation of its history. Every step in his arduous path seems to have been taken only after the exercise of deliberately matured forethought. A few illustrations must be gleaned from the many that are scattered through the pages of his journal, to direct attention to this honorable characteristic. When the Doctor had formed his own resolution to remain in the brig through the second winter, he made the following entry, under date of August 22—"I shall call the officers and crew together, and make known to them very fully how things look, and what hazards must attend such an effort as has been proposed among them. They shall have my views unequivocally expressed. I will then give them 24 hours to deliberate, and at the end of that time all who determine to go shall say so in writing, with a full exposition of the circumstances of the case. They shall have the best outfit I can give, an abundant share of our remnant stores, and my good-by blessing." On the 6th of April, the Esquimaux auxiliary, Hans, was gone to Etah with a sledge, to seek a supply of walrus meat, when one of the men deserted from the ship, and the commander suspected with some sinister design upon Hans and the sledge. He then wrote: "Clearly, duty to

this poor boy calls me to seek him, and clearly duty to these dependent men calls me to stay. Long and uncomfortably have I pondered over these opposing calls, but at last have come to a determination Hans was faithful to me; the danger to him is imminent—the dan-danger to those left behind only contingent upon my failure to return. With earnest trust in that same Supervising Agency which has so often before, in graver straits, interfered to protect and carry me through, I have resolved to go after Hans." The Ésquimaux lad was proof both against the violence and the seduction of the deserter. Tho commander found him invalided, but safe, at Etah. Hans, however, did not return to Fiskernaes with the expedition. His fate is involved in romance. Venus Victrix has a representative even in frost land. The reader must go to the pages of Dr. Kane to know what became of Hans.

When the preparations for the final escape were under consideration, the following record was made in the Doctor's journal:—" Whatever of executive ability I have picked up during this brain and body wearying cruise, warns me against immature preparation or vacillating purposes. I must have an exact discipline, a rigid routine, and a perfectly thought-out organization. For the past six weeks I have, in the intervals between my duties to the sick and the ship, arranged the schedule of our future course; much of it is already under way. My journal shows what I have done, but what there is to do is appalling." Appalling as it was, the heroic man who had to look the necessity in the face was equal to the position. There can be no doubt that it was the "*exact discipline, the rigid routine, and the perfectly thought-out organization*" which restored the sixteen survivors of the expedition to civilization and their homes.—*Chambers' Journal.*

Tonnage of the United States.—The following table shows the relative amount of tonnage owned in the large ports which have over fifty-thousand tons registered at the custom-house of the district:

	June 30, 1856.	June 30, 1855.
New-York	1,328,036	1,228,234
Boston	521 117	516,268
Philadelphia	197,228	294,806
Baltimore	183,344	183,108
Bath	193,320	175 258
New-Orleans	163,308	200,8[illegible]6
Waldoborough	155 873	148,89[illegible]
New-Bedford	153,000	169,9[illegible]
Portland	136 154	187,[illegible]
Buffalo	89 929	76[illegible]
Chicago	57,407	50,[illegible]

	June 30, 1856	June 30, 1855.
Cleveland	69,919	51,578
Detroit	58,688	65,058
Belfast	76,612	70,762
Barnstable	63,136	80,615
Charleston	59,128	56,419
San Francisco	80,750	87,842
Cuyahogo	60,916	——

The tonnage employed in steam navigation is principally owned as follows:

New York State	155,786
New Orleans	51,751
St. Louis	38,745
Pittsburg	37,505

THE INFLUENCE OF MODELS UPON THE RUNNING QUALITIES OF STEAMBOATS.

An experienced steamboat master upon the western lakes furnishes the following brief account of the results of changing engines from old boats to new ones of greater displacement, and improved shape for running, which will be interesting, as illustrating the advancement of steamboat-building in this country. We trust that there are among our readers many others in possession of facts of like character, which they would like to place in our hands for publication. It is desirable, that as many of the particulars as can be ascertained be furnished, with a view to elucidating the problem of how far the model is influential in the speed of vessels. It has been said by theorists that a given amount of *power* is equal to the task of attaining *any rate of speed* whatever, provided the model be sharpened to a commensurate degree of fineness. But there must be limits to the advantages of reducing the fluid resistance by modelling, and these will be found in the qualities of weight and friction; for a model may be sharpened to such a degree that a vessel built from it would not bear the load of propelling machinery, while the friction upon such an extended surface of hull as must necessarily be developed would be enormous.

Messrs. Editors:—The following statistics of steamers upon the western lakes may be worth publication as showing the influence of the model upon the speed of boats with the same engines:

The steamboat *United States* was built at Huron, Ohio, in 1834. Length, 140 feet, breadth, 28½ feet, depth, 10 feet, tonnage, 366 tons: engine, hori-

zontal high pressure, 7 feet stroke and 28 inch bore, with 7 cylinder boilers 17 feet long, 42 inches diameter. Average pressure of steam, over 100 lbs.; average speed, about 10 miles per hour; draught of water, 6½ feet. She was a bad sea-boat, and rolled heavily in the trough of the sea. Her successor was the

Steamer *A. D. Patchin*, built at Trenton, Mich., 1846. Length, 230 feet; breadth, 29 feet; depth, 13 feet; tonnage, 850 tons. The engine was transferred from the *United States* to the *Patchin*, and steam was furnished by six new cylinder boilers, 18 feet long, with two flues in each. Average pressure of steam, about 90 lbs.; average speed, 11 miles per hour; draught of water, light, 5 feet 10 inches. The distance from the water to the top of upper cabin was 30 feet. The hull was built of white oak, with a bateau bottom, solid timbered quite to the top of bilge, and from stem to stern; she was one of the best sea-boats upon the western lakes. During five years that I commanded her, I do not believe that she ever rolled inte the trough of the heaviest sea over one foot; yet she encountered the severest gales upon our lakes. She passed through Lake Huron, Nov. 25th 1846, in the height of the gale and snow-storm that wrecked the steamer *Atlantic*, on Long Island Sound; and the new steamer *Boston*, a boat about the same size as the *Patchin*, was wrecked at Milwaukie. The *Patchin* was heavily laden, but did not meet with the slightest accident.

The steamer *Thomas Jefferson* was built at Erie in 1835. Length, 174 feet; breadth, 27 feet; depth, 10 feet; tonnage, 450 tons. Engine, low pressure, built by Allaire, New-York. Length of stroke, 9 feet; diameter of cylinder, 50 inches. She rolled heavily in the trough of the sea, was a very bad sea-boat, did not have an upper cabin. Draught of water, light, 6 feet; best speed, 10 miles per hour. She gave place to the

Steamer *Louisiana*, which was built at Buffalo, in 1846. Length, 218 feet; breadth, 29 feet; depth, 13 feet; tonnage, 800 tons. The engine was transferred from the steamer *Thomas Jefferson*. The boilers were low-pressure. Draught of water, 6 feet. She had a fine upper cabin, and a fair running model. Average speed, 11 miles per hour. Is a very good sea-boat—does not roll in the trough of the sea.

The steamer *Macomb* was built in Detroit, in 1838. Length, 90 feet. breadth, 20 feet; depth, 8 feet. Engine, square high-pressure. Speed, 8 miles per hour; draught of water, 5 feet. A very bad sea-boat. She was laid aside for the

Steamer *Helen Strong*, which was built at Monroe, Mich., in 1845. Length, 150 feet; breadth, 20 feet; depth, 10 feet; draught of water, 4 feet. The engine was transferred from the steamer *Macomb*, with cy-

lindrical double-flued boilers. Speed, 10 miles per hour. She had an upper cabin, with good running model, and was an excellent sea-boat.

The steamer *Buffalo* was built at Buffalo, in 1837. Length, 195 feet; breadth, 29 feet; depth, 11 feet; tonnage, about 600 tons. Engine, low-pressure, built at the Allaire works, New-York. Length of stroke, 9 feet; of cylinder, 54 inches, with the common low-pressure form of boilers. The frame was of chestnut timber, and the hull built expressly for speed. Without upper cabin. Draught of water about 6½ feet; speed, from 12 to 13 miles per hour. She was succeeded by the

Steamer *Queen City*, built at Buffalo, in 1848. Length, 248 feet; breadth, 30 feet; depth, 14 feet; tonnage, 1000 tons. The *Buffalo's* engine was transferred to the *Queen City*, with the common low-pressure form of boiler. Draught of water, light, 6½ feet. She has a fine upper cabin, and good running model. Average speed, 15 miles per hour. Is a good sea-boat, having encountered many of the severest storms upon our lakes for the last eight years, without an accident.

The steamer *Rochester* was built at Cleveland, in 1838. Length, 150 feet; breadth, 31 feet; depth, 11 feet; tonnage, about 450 tons; draught of water, 6½ feet. Engine, high-pressure square, 8 feet stroke, 28 inch bore, with 8 double-flued cylinder boilers, 17 feet long, 42 inches diameter. Speed, about 10 miles per hour. She was a bad sea-boat, rolled heavily in the trough of the sea.

The steamer *Minnesota* was built at Maumee, Ohio, in 1849. Length, 220 feet; breadth, 31 feet; depth, 13½ feet; tonnage, 900 tons; draught of water, 6 feet. The engine was transferred from the steamer *Rochester*, with 4 new double-flued cylinder boilers, 30 feet long, 42 inches in diameter. Her speed was 10 miles per hour, with one-half the grate surface and one-half the consumption of fuel used in the steamer *Rochester*.

There are many other instances of engines transferred from small boats to large ones, with like results.

H. Whitaker.

ABSTRACT LOG OF CLIPPER-SHIP SURPRISE, FROM SHANGHAE TO NEW-YORK.

With great pleasure we publish the following log of the *Surprise*, from Shanghae to New-York:

Messrs. Editors:—I send you an abstract log of the shortest passage ever made from Shanghae to New-York, thinking, as you have published that of the *Panama*, you might perhaps do so by mine. Many of your readers have inquired of me how I came, and about the different sections of my passage—they can see by this.

Charles S. Ranlett, *Master of Ship Surprise.*

ABSTRACT OF LOG OF SHIP SURPRISE, CHARLES A. RANLETT, MASTER, FROM SHANGHAE TO NEW-YORK, 4TH VOYAGE, 1857.

D'te	Dy's o't	Lat.	Lon.	Log Dist.	Dist. s'ld.	Bar	Temp. A.	Temp. W.	WINDS. 1st part.	WINDS. 2d part.	WINDS. 3d part.	REMARKS.
Jan. 2	1	28 16	123 44	222	222	30. 8			N W	N	N N E	Left the River at 2 P.M., discharged James Potter off light-ship Strong wind. Winds near Saddle Islands at 10 P.M Strong breeze and rough sea.
" 3	2	25 45	119 56	228	445	30. 8			N W	N N E	N E	Strong N. E. Wind and rough sea. Double reefs. Clear.
" 4	3	22 31	117 40	243	688	30. 9			N E	N E	N E	Strong N. E. trade winds.
" 5	4	20 20	114 8	244	932	30	Not noted in the Chinese Seas.	Not noted in the Chinese Seas.	N E	N E	N E	Cloudy and moderate. Trade winds.
" 6	5	16 2	113 24	267	1,199	30			N N E	N N E	N N E	Good breeze and cloudy.
" 7	6	13 55	112 18	203	1,407	30. 1			N N E	N N E	N N E	In the night, clear weather. Day-time cloudy. Tolerably good breeze.
" 8	7	9 48	110 4	234	1,641	29. 8			N N E	N E to N N E	N	Stiff breeze.
" 9	8	6 50	108 28	202	1,843	30			N	N	N N E	First part, light breeze. Last part, moderating. Going only six miles.
" 10	9	6 15	127 29	110	1,953	30			N N E	N N E	N N E	Light and steady breeze. Sea very smooth, and fair.
" 11	10	2 50	166 59	160	2,113	30			N N E	N N E	N N E	Light breeze throughout.
" 12	11	0 10	107 7	260	2,373	30			N	N	N	Light breeze, ship making 7 miles an hour. Passed St. Barbe and other islands, and crossed the line at 1 P. M.
" 13	12	3 9	106 59	160	2,113	30			N N E	N	N N W	Moderate, and light winds.
" 14	13	5 50	115 55	190	2,663	30			N N E	N W to W N W	N	In the Straits of Sundu. Wind very high.
" 15	14	6 27	104 41	80	2,743				Variable	and	Squally	Light Winds. Variable and squally.
" 16	15	8 44	103 24	140	2,889				NW by W	W S W	to S W	Light winds and squally. Some rain. We are out past Java Head, and fairly in the Indian Ocean.
" 17	16	10 5	101 34	121	3,010	30	81	78	S	S S E	Variable	Fresh breeze first part. Middle and last part calm and variable winds. Breezes small.
" 18	17	11 56	100 16	180	3 790	29. 9	81	82	S S E	S	S S W	Tolerable breeze from northward. Some squalls. Get along a little faster.
" 19	18	12 37	98 4	116	3 306	29 9	80	80	Variable and	and Squally	S Westerly	Light winds commence. Get along slowly.
" 20	19	12 55	97 30	41	3,347	99. 9	80	80	Calm	Squalls and	Variable	Long spells of calms, and very hard spells of light airs.
" 21	20	13 49	95 55	119	3 466	29. 9	77	79	S	S S E	S to E S E	Light breezes, light squalls, but fair. Made a little more distance.

ABSTRACT OF LOG OF SHIP SURPRISE, CHARLES A. RANLETT, MASTER, FROM SHANGHAE TO NEW-YORK, 4TH VOYAGE, 185[illegible].

D'te		Dy's o't	Lat.	Lon.	Log Dist.	Dist. s'ld.	Bar.	Temp. A.	Temp. W.	WINDS. 1st part.	WINDS. 2d part.	WINDS. 3d part.	REMARKS.
Jan.	22	21	15 42	92 2	252	3,718	29. 8			S S E	S E	S E	Good fresh S. E. trade wind. Made 522 miles.
"	23	22	17 14	87 58	255	3 973	29. 8	80	79	E S E	S E	S E	Good fresh trade winds.
"	24	23	18 56	84 29	220	4,193	29. 8	80	79	E S E	E	E	Fresh breezes past 4 hours. Night light, and lightning at midnight.
"	25	24	20 6	81 25	194	4 387	29 8	79	79	E	E by N	E N E	Light trade wind, and fine weather.
"	26	25	20 38	78 50	160	4 547	29. 6	77	79	E by N	E N E	E by N	Light trade wind, and fine weather.
"	27	26	21 1	76 6	164	4,711	29. 8			E	E	E by N, E by S	Light trade wind, and fine weather.
"	28	27	21 36	73 25	162	4,876	29. 8	79	79	E S E	E ½ N	E by N, E by S	Light trade wind, and fine weather.
"	29	28	22 29	70 50	178	5,046	29. 8	80	79	E S E	E	E	Light trade, a little more wind, fine weather.
"	30	29	22 45	66 42	234	5,280	29. 8	79	79	E S E	S E by E	S E by E	Good fresh breeze, ship goes 10 miles per hour.
"	31	30	23 57	62 36	257	5,537	29.40			E N E	E N E	E N E	Strong breeze.
Feb.	1	31	26 7	59 45	240	5 777	28.70			E N E	N E	N E	Had a hurricane from midnight, Jan 31, to Feb. 1, at noon.
"	2	32	26 18	59 10	83	5 810	29.75			N N W	Calm	Calm and SSW	Gale over.
"	3	33	27 5	56 00	208	6,018	30	74	75	S S E	S E	S E	Calm all yesterday, good breeze to-day. Off the islands Mauritias and Bourbon.
"	4	34	28 1	53 33	232	6,245	30	74	75	S E by E	E S E	E to E S E	Cloudy.
"	5	35	28 51	49 7	261	6 506	30	74	75	E S E	E S E	E S E	Strong trade winds, cloudy weather, very rough sea.
"	6	36	30 10	43 37	250	6,756	30			E S E	E by S	E S E	Good fresh breeze and rough sea.
"	7	37	30 50	39 33	170	6,926	29. 9			E	E	Variable	Cloudy and moderate.
"	8	38	30 36	35 56	190	7,116	30	71	74	S W	S W by S	S W by W	Breeze sprung up at 1 P.M., continues fresh.
"	9	39	30 38	34 9	114	7,231	30. 5	72	76	S W	S and Calm	S W	Good breeze, moderating middle part.
"	10	40	31 50	32 17	128	7,354	30. 5	72	74	S E	S E	E to E S E	Light Winds, fine weather, and smooth sea.
"	11	41	33 36	29 19	191	7,545	30. 5	72	76	E N E	E N E	E N E to N E	Moderate breeze and clear weather. Point Natal, coast of Africa, cape Good Hope, bears north.
"	12	42	34 28	27 6	143	7,688	30.10		72	E N E	E N E & Calm	Calm	Cloudy and Clear alternately. Strong tide. Water colder.
"	13	43	34 39	25 23	76	7,764	30 10	72	74	Calm and	N E	E and Calm	Calm most of the 24 hours.
"	14	44	35 31	21 4	221	7,985	30 20	70	69	Calm & S S W	S S E	S E	Breeze sprung up at 1 P.M.
"	15	45	35 4	14 55	296	8,279	30.10	68	68	S E	S E	S E by S	Good breeze, fogs and squalls passing over.

ABSTRACT OF LOG OF SHIP SURPRISE, CHARLES A. RANLETT, MASTER, FROM SHANGHAE TO NEW-YORK, 4TH VOYAGE, 1857.

D'te	Dy's o't	Lat.	Lon.	Log Dist.	Dist. s'ld.	Bar.	Temp. A.	Temp. W.	WINDS. 1st part.	WINDS. 2d part.	WINDS. 3d part.	REMARKS.
Feb. 16	46	34 8	10 9	242	8,521	30.10	66	66	S E by S	S S E	S S E	Good breeze and foggy, squalls passing over, with fine rain.
" 17	47	32 42	5 56	240	8,761	30 10			S S E	S E & S S W	S S E	Fresh breeze, misty and squally.
" 18	48	32 1	2 12	188	8,949	30			S S E	S E & S S E	S E & SSE	Wind dying away.
" 19	49	30 40	W 30	165	9,114	30	67	70	E N E	E N E	N E to N	Wind light and growing less. Sea tolerably smooth, and misty rain.
" 20	50	29 48	3 23	175	9,289	30	71	70	N E	N E & Calm	N E to N	Smooth sea. Current 1 mile an hour to the westward. Clouds hanging all around.
" 21	51	28 38	4 41	82	9,371	30	73	73	Calm S W	S S E	S S E & S E	8 P M. a light air sprung up. Sea smooth, and pleasant weather.
" 22	52	27 5	6 54	150	9 521	30	74	74	S E	S S E to E	E & E N E	Light winds, and fine, pleasant weather.
" 23	53	25 21	10 6	210	9,731	30	75	76	E S E	E N E	E N E	Light wind in the night, and squalls in the daytime.
" 24	54	23 48	13 20	200	9,931	30	74	77	E N E	N E to	E N E	Wind Variable. Considerable fine weather.
" 25	55	22 8	15 12	147	10,078	30	77	78	E N E	E N E to S E	N E to S E	Squally. All the spare cast adrift. Crew cleaning ship, for painting.
" 26	56	20 44	16 57	180	10 258	30	77	78	N N E to N E	N E	E to N E	Squalls blow over us. Rain.
" 27	57	19 1	19 28	190	10.448	30.	77	76	E	E S E to S E	S E to E S E	Light regular trade wind, and fine weather.
" 28	58	17 23	21 12	164	10,612	30.	78	77	E to S E	E to S E	E to S E	Very light wind.
Mar. 1	59	15 46	22 54	142	10 754	30.	79	78	E S E to S S E	S S E to E	E S E to E N E	Fine pleasant weather throughout. Finished painting on deck.
" 2	60	12 55	25 12	223	10.977	30.	78	78	E	E	E	Good breeze, and very fine weather. Crew painting aboard ship.
" 3	61	9 50	27 25	235	11 212	29. 9	79	79	E S E	E S E	E S E	Good breeze and fine weather.
" 4	62	7 00	29 37	215	11 427	29. 8			E S E	E S E	E S E	Fine weather, wind steady.
" 5	63	4 8	31 37	206	11,633	29.80			E S E	E S E	S E	Fresh, moderate breeze.
		1 24	34 15	228	11,861	29 80	82	80	S E	S E to S S E	S S E to N E	Moderate breeze.
		50	36 21	190	12 051	29. 8	76	73	S E to N E	N N E	N E	S. E. trade-winds left us at 1 P.M., and N. E. trades came up in a squall. Blew hard all night, and rain plenty.
		[illegible]	39 19	268	12,308	29.90	79	79	N E	E N E to N E	E N E to S E	Good fresh N. E. trade winds. Rough sea.
		[illegible]	42 51	268	12,576	29.00	79	79	N N E	N N E	N E by N	Strong trade winds. Copper getting very bad, and rolling up.
		6	45 43	240	12,816	29.90	78	77	N E	N E	N E	Strong trade winds. Our head is gone, and copper getting bad

ABSTRACT OF LOG OF SHIP SURPRISE, CHARLES A. RANLETT, MASTER, FROM SHANGHAE TO NEW-YORK, 4TH VOYAGE, 1857.

D'te	Dy's o't	Lat.	Lon.	Log Dist.	Dist. s'ld.	Bar.	Temp. A.	Temp. W.	Winds. 1st part.	Winds. 2d part.	Winds. 3d part.	REMARKS.
Mar. 11	69	11 52	49 16	275	13,091	30.	77	76	N E	N E	N E	Strong trade winds. The figure-head entirely carried away.
" 12	70	14 36	53 [illegible]	270	13,361	30. 1	76	76	N E to E N E	N E to E N E	N E to E N E	Strong trade winds, and squally. Rough sea. Ship rolls heavily.
" 13	71	17 30	56 25	270	13,631	30.	76	76	N E to E N E	N E to E N E	N E to E N E	Strong N. E. trade winds. Squally, with severe rain. Rough sea,
" 14	72	20 32	59 56	276	13,907	30. 3	76	74	N E	N E	N E	Continues a good strong breeze, and squally.
" 15	73	23 49	62 15	246	14,153	20. 3	76	74	E N E	E N E	E & E S E	Fresh N. E. trades. Less wind.
" 16	74	26 26	64 35	205	14,358	30	74	73	E S E	S E	S E	Light wind, smooth sea, and fine weather.
" 17	75	28 31	66 26	160	14,818	30	73	70	S E	S S E	S S E	We have lost the Trades, but have a good breeze, and the ship gets along finely.
" 18	76	29 45	67 17	86	14,604	30. 1	72	71	S S W	Calm	E N E	Squally and calm.
" 19	77	31 38	69 18	162	14,766	30	70	68	E N E	E S E	S	Light fair wind.
" 20	78	34 13	70 6	183	14,949	29.80	89	64	S S W	W N W	W N W	Strong gale part of this day.
" 21	79	36 26	70 7	120	15,069	30		69	W N W	W N W	N W by W	Strong wind. Middle and last part, dying away.
" 22	80	37 37	70 47	98	15,178	30.30	84	59	N W	N W	N W by W	Gales of wind.
" 23	81	38 9	72 37	92	15,270	30. 3	48	49	N W	N	N N E to E	Latter part moderate.
" 24	82	39 32	74 08	129	15,399	39.50			S by E	W S W	Calm	Put in for Sandy Hook, and lay too for daylight. Pilot came aboard 5 A.M. of the 25th.

Ship Surprise, 1261 *tons, built by Samuel Hall, of East Boston, modelled by Samuel Pook, of Boston,* 6 *years old.*

FOR THE U. S. NAUTICAL MAGAZINE.

VERTICAL TUBULAR BOILERS.

MARTIN'S *versus* MONTGOMERY'S.

MESSRS. EDITORS :—There appears to have commenced a very interesting discussion upon this subject in your MAGAZINE, and as I believe it is usual to consider these controversies "free fights," I beg to be permitted to enter the lists, and throw in a few solid shot, explosive shells appearing to have been thus far the order of the day.

Although "Justice" regards the "vertical tubular" as the best type of boiler, he is particularly severe upon that form of it which has been patented by Mr. Martin, and as particularly eulogistic of that patented by Mr. Montgomery, insinuating very strongly that "L'Clair" would be very careful to say nothing that should reflect in the slightest manner against the Martin form. The controversy would therefore appear to be between these two types, or at least "Justice" would make it so, and as such I enter it; and as a third correspondent has furnished, in last month's number, a sketch of his *beau ideal*, I send you a drawing of his abomination, that they may be on equal terms.

Before entering into the comparative merits of the two boilers, I wish to answer some of the attacks volunteered by "Justice" upon the Martin patent, and correct some of his arguments, which, although as favorable to the one as the other, are wrong as applied to any boiler.

He tells us that although the model of the *Fulton* is a beautiful one, her boilers are the cause of her being the slowest of our steamships. I know nothing of the vessel except that she has Martin's boilers, and that they are or were deficient in draught. With regard to this—their only fault—although they are on his general plan, he did not proportion them, and as in all vertical tubular boilers greater "calorimeter" is required than with the ordinary horizontal tubular, or flue-boilers, with which the designer had been familiar, it is not surprising that he should fail to a certain extent in his draft. They are only an evidence that correct proportions are necessary to the success of any boiler, however good the general design.

Those contained in the new frigate *Merrimac*, about which so many hard things were written last summer, are an evidence of another fault which is sometimes committed, viz.: that boilers are placed in charge of men, after they are built, who have not the ability to make any boiler perform creditably. Complaints were made that they could

enough in a calm to drive the ship two knots an hour

which the Captain did not consider it prudent to tri

two knot currents of the passage of the "Hole in the Wall," on his way from the capes of Virginia to Havana, but went through the "windward passage," and around the island of Cuba, instead, increasing the distance from 1200 to 2400 miles, to avoid a two-knot current. As soon as a change was made in the chief engineers of the vessel, it was suddenly found that more steam than was required could be obtained from the boilers, under all circumstances, and that there was no further necessity to make detours to avoid currents.

Further on, "Justice" says that a certain "difficulty is also illustrated in a *ludicrous* manner, in those boilers which go far to constitute the cargo of our navy." "Ludicrous" is certainly a very singular term to apply to *any* form of boiler which has inspired sufficient confidence to be placed in an ocean steamer. Perhaps, however, this is only his *style*—if so, I have nothing to say; every man has a right to peculiarity of style so long as he writes sense; no man can, however, write sense when he is writing on a subject about which he knows little or nothing. In order to enable him to write sensibly in future, even though it be in his peculiar way, I will post him a little on this point.

His remark that these boilers go far to constitute the cargo of our navy, is, I suppose, intended to convey the idea that they are either heavier or more cumbersome than ordinary boilers; at least that is the idea naturally suggested by his remark. With regard to the facts in this respect, the frigate *Susquehanna* furnishes the best example we could wish. She made a four years' cruise in the East Indies, with double return flue-boilers of copper. One year ago these were replaced by the Martin boiler. The old boilers weighed 176 tons, the new, 118 tons; they were, therefore, 58 tons lighter, and they were so much smaller that 100 tons of coal could be stowed in the space vacated; and so far from diminishing the power to obtain these advantages, this was increased 33 per cent. As far, therefore, as "cargo" was concerned, there does not appear to have been, in this case, any real ground for "Justice's" remark in the new style. The *Susquehanna* has been in active service nearly a year, and comparing the logs lately received from her with those of the former cruise, it appears that with the same speed she now burns 100 lbs. of coals where she formerly burned 183 lbs. The above are simple facts, which do not require argument. I shall now notice a few of his *arguments* on the general subject. After enumerating the good qualities which a boiler should possess, he says—the economy of the fuel "depends upon various circumstances, of which the most important are: the rate of combustion; the arrangement of the heating surfaces; their proportion to the quantity of fuel consumed; and the circulation of the water in contact with them." All this is excellent; but he immediately after falls into an error which is

very popular among engineers, both of the constructing and managing classes. This is, that more heating surface per pound of coal is required with quick than with slow combustion. He admits that the same quantity of air is required, and the same amount of heat evolved, in both cases, but looks upon it as a necessity that the velocity of the heated gases in contact with the heating-surfaces must be greater with the quick combustion than with the slow. This is true when changes are made in the rate of combustion in a boiler already constructed; but he has not yet got his boiler built, and is therefore untrammeled. There is a good deal of harping among engineers upon the subject of "quick combustion" and "slow combustion," as though there was something very important about it, and as though there was something radically different in the nature of the phenomenon of combustion when the coal was being quickly burned than when it was burned slowly. In reality, however, any certain lump of coal would be burned in the same time where the one rate obtained, as it would with the other, the only difference being that a greater number of pounds is burned on a square foot of grate in one case than in the other; and to effect this, we require deeper fires, and a correspondingly greater velocity of air *through the coals*. But it does not follow that the velocity must be greater after the heated gases leave the fires, until a certain limit is reached, and as that limit is much above what is ever applied in practice, it does not affect the result. By simply bricking over a portion of the grate-surface of a boiler in which "slow combustion" obtains, and burning the same amount upon the reduced grate-surface, there will result quick combustion. The same amount of air will pass through the coals, the same amount of heat will be evolved, and the same velocity will be maintained through the tubes or flues, and consequently the velocity and temperature of the gases in the smoke-pipe will be the same. If there is any difference in the supposed case, the velocity will be a very trifle less, because there must be a little greater difference of pressure between the ash-pit and furnace with the quick combustion than with the slow, in order to create the greater velocity through the coals. This, however, would be very slight, and in constructing a new boiler could be provided for by as slightly increasing the cross area between the heating surfaces. My studies and observations upon this subject have led me to adopt the rule that each pound of coal consumed per hour requires three square feet of heating surface, without regard to amount burned upon a square foot of grate, and that fifteen pounds per hour can be burned upon a square foot of grate as economically as half that amount, where the same proportion of heating surface per pound of coal exists.

"Justice" makes a mistake in supposing that the temperature of th heated gas is higher in the case of quick combustion than with slow. So

experiments were made in this direction by Chief Engineer B. F. Isherwood, U. S. Navy, two years ago. He found that the temperature at the bridge wall was in each case between the melting points of silver and copper, the latter exhibiting the appearance of having sustained the same degree of heat in each case. These melting-points are supposed to be—for the former, 1850° Fahr., and for the latter, 2160°. His deduction, therefore, "that the greatest economy, both of fuel and space, calls for the slowest combustion that will maintain the temperature due to the desired pressure of the steam," can only apply to boilers already built, the temperature spoken of being that of the smoke-pipe.

Speaking of the incrustations of boilers, he says—"if two opposing currents can be formed, made to meet, and destroying each other's motion, deposit, during their temporary quiet, the solid matter they had suspended on a surface not exposed to the fire, it will be seen that the mass will be in a pulpy form, and not being indurated by the heat, may be readily blown out." Now it so happens, in marine boilers, that, firstly, it is only on the heating surfaces that incrustations are formed; secondly, that it is fomed as rapidly on those where there is rapid motion as where it is at rest, provided that the water contains the same amount of foreign matter in each case. The fact that less incrustation is found in those parts of the boiler where the motion is most rapid, is due to the fact that when in any part of the boiler the circulation is very sluggish, the water in that part becomes more saturated than when the circulation is good. In fine, the amount of deposit depends upon the temperature of the plate, and the degree of saturation, without regard to the rapidity of the motion. This sediment can only be got rid of by blowing out a certain proportion of the water which is pumped into the boiler; and fourthly, every form of surface which has been used at sea is more easily cleaned than the "smooth interior of a tube." The foregoing remarks apply to all kinds of boilers. The sketch on page 114 exhibits those recently placed in the old frigate *Mississippi*, and may be taken as a sample of Mr. Martin's boiler, as applied in the navy. The sketch, with the assistance of the arrows, showing the direction of the heated gases, is self-explanatory to all who are familiar with marine boilers.

The following are their dimensions:

	Ft.	In.
Length of each	11	
Breadth of each	22	6
Height of each, exclusive of steam chimney	12	2
Height of steam chimney above boiler	2	
Diameter of " (both boilers)	11	2
Diameter of smoke pipe	7	2

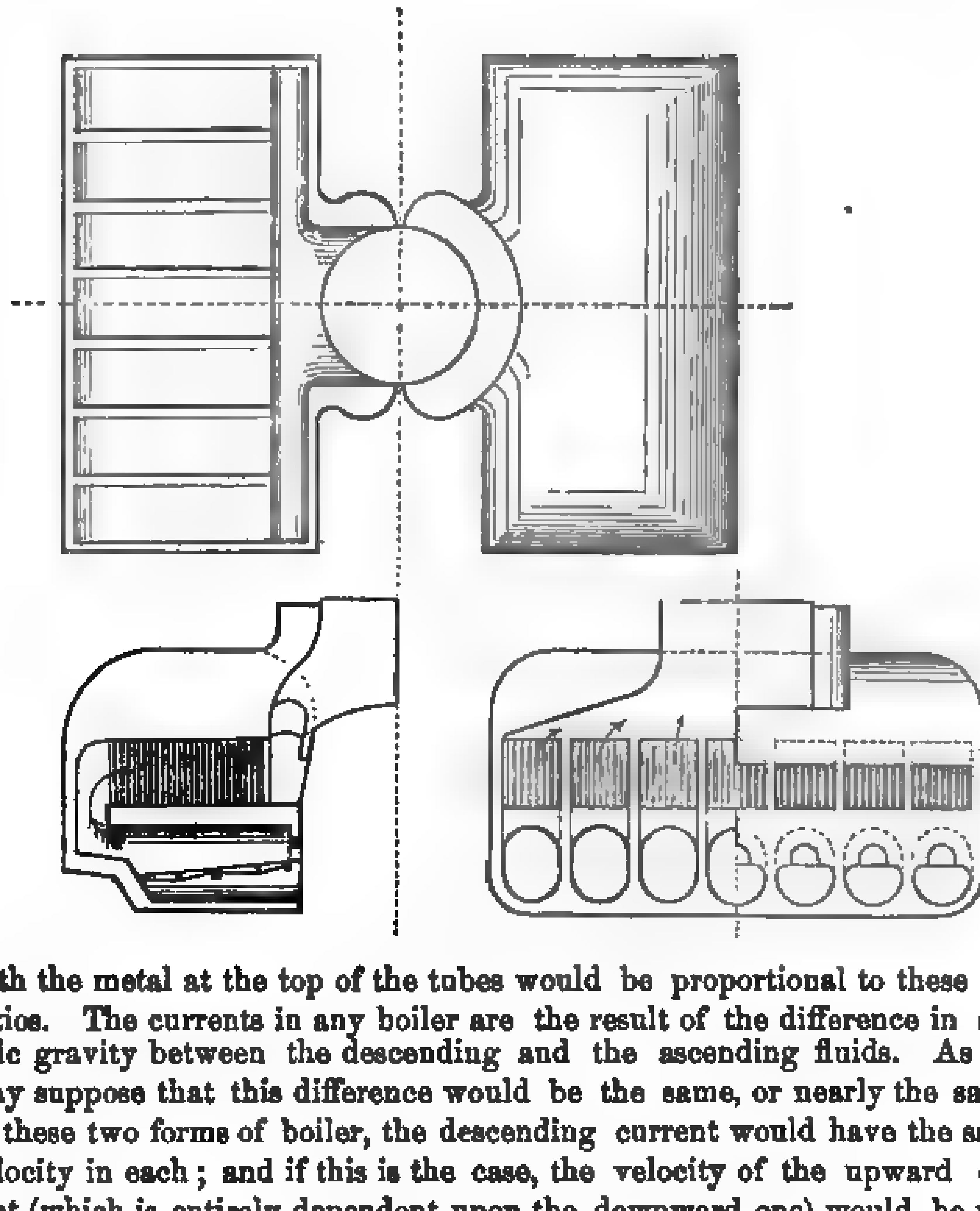
	Ft	In.
Length of grate	7	
Breadth of each furnace	2	8
Length of tubes (brass)	3	
Outside diameter of tubes		2½
Number of tubes over each furnace	224	
Number of furnaces (both boilers)	14	
Area of grate surface	261.83 sq. ft.	
Area of fire surface	7676. "	
Ratio of fire to grate surface	29.37 to 1	
Cross area between tubes (straight passages where zigzag is greatest)	5040 sq. in.	
Ratio of cross area to grate surface	19.28 sq. in. to 1 sq. ft.	
Ditto to fire surface	656 " "	
Amount of steam capacity	1300 cubic feet	
Ratio of fire-surface to ditto	5.9 sq. ft. to 1 cub. ft.	
All water spaces are 6 inches wide, except—		
Beneath the ash-pits, where they are		5½
Back of, and under bridge wall		10
Between wing furnaces and tube boxes, and shell		7
Between crown-sheet and lower tube sheet, at back		10
" " at front		12
(The tube box being inclined 2 inches towards the back.)		
Breadth of fire-room	9	
Total area required for boilers and fire-room	705 25 sq. ft	
Ratio of fire-surface to ditto	10.88 to 1	

The tubes are set in, in a peculiar manner. There are in each tube-box, 8 longitudinal rows, with 28 tubes in each row—in other words, 28 cross-rows. The centre-lines for the cross-rows are straight, and have 8 tubes in each one. The centre lines for the longitudinal rows commence at the back connection, each at a point. Two lines for each row are then drawn, so as to diverge half an inch at the front connection, so that there is no zigzag at all, as the smoke enters among the tubes, but as it leaves them there is half an inch.

Montgomery places his tubes on straight lines in the longitudinal rows, but crosswise there are twice as many rows as there are tubes in a longitudinal row; that is, a tube in one row is opposite a space in the contiguous ones. This is, in effect, giving a slight zigzag, as it causes the heated gases to reverbate.

"Justice" complains that the tubes of these boilers have to [illegible] much steam through them that they are converted "from [illegible] *heated* surfaces, tending to the oxidation of the tubes, and [illegible]-tion of the unprejudiced observer." Let us compare th[illegible]ee which design will be likely to have the most [illegible] the metal at the top of the tubes.

To do this, we must compare the area within the tubes with the amount of heating-surface which generates the steam that passes through them in each boiler. If the velocity was the same in the ascending currents in both boilers, this would be sufficient, as the amount of water in contact



with the metal at the top of the tubes would be proportional to these two ratios. The currents in any boiler are the result of the difference in specific gravity between the descending and the ascending fluids. As we may suppose that this difference would be the same, or nearly the same, in these two forms of boiler, the descending current would have the same velocity in each; and if this is the case, the velocity of the upward current (which is entirely dependent upon the downward one) would be proportional to the areas of the downward current, compared with those of the upward.

The Montgomery boilers in question have each 588 tubes of 2 inches outside diameter, and 5 feet in length, and they only convey through them the steam that is formed in them. These tubes are made of iron one-tenth of an inch thick. This gives us an aggregate area of 588 tubes for

the conveyance of steam and water, 1496 sq. in. They present to the fire, 1540 square feet of heating-surface. Ratio, 971 square inches area to 1,000 square feet heating surface.

One of the boilers of the *Mississippi* has 1568 tubes of 2½ inches outside diameter, and 3 feet in length They convey through them the steam formed in them, and also that which is formed on the sides, tops, and fronts of the furnaces, and the sheet which connects the back of the furnace to the tube-sheet. The aggregate area in these 1568 tubes is 5174 square inches.

The heating surface of the tubes amounts to 2770 square feet; that of the furnaces, &c. the steam from which passes through the tubes, to 332 square feet. Total 3102 square feet.

Ratio 1668 square inches area in tubes to 1000 square feet heating surface and, 971 : 1668 : : 1000: 1707. That is, if the velocity through the tubes was the same in both cases, the amount of water in contact with the metal of the upper ends of the tubes in the boilers of the "*Mississippi*," compared with that of the Montgomery plan, would be as 1707 to 1000. Now if we obtain the relative velocities through the tubes, we can arrive at the correct ratio.

In each of the Montgomery boilers there is one tube box, and on each side of this there is a water space 4 inches wide and of 9 feet or less in length; this is the only provision for a descending current for the supply of the tubes. This is equal to 864 square inches.

Area in tubes 1496 square inches. Ratio, 560 to 1000.

The boilers of the "*Mississippi*" have each 5436 square inches area for descending currents, besides that back of the back connections which I allow for the supply of that part of the heating surface which does not send its steam through the tubes.

Area in tubes 5174 square inches. Ratio 1050 to 1000 and, 560 : 1050 : : 1000: 1875. That is to say, if we call the velocity in the tubes of the Montgomery boiler 1000, that in the tubes of the boilers of the "*Mississippi*" will be 1875. To find the comparative amount of water in contact with the metal at the top of the tubes, we must multiply this relative velocity into the relative amount, if the velocity had been the same, and we have the amount with the different velocities, 1875 × 1707 = 3.2 times the amount in the Martin, that there is in the Montgomery boiler. Two elements have necessarily been left out of this calculation because their amount could not be known, and which would have slightly affected the result; but as they are neither of them very important, and affect the sult in contrary directions, we are probably not far wrong. These first, the steam which is formed by the sides and crown sheets furnaces, and passes up through the tubes in Martin's boiler, ente

with the water and occupies a portion of the central space, while that which is formed in the tube remains in contact with the metal during the whole ascent, and as in the Montgomery boiler, all the steam at the top of the tube has been formed in it, it will all be in contact with the metal at the top, to the exclusion of the water; while in the Martin plan a portion will be in the centre and an equal portion of water will be added to that in contact with the metal.

The second element referred to is the error of assuming that the descent of the water would be the same in both boilers. The Montgomery boiler had more fire-surface compared to the area of the ascending currents, than Martin's; consequently, a greater portion of that current would be in the form of steam, and the difference in the specific gravity of the upward and downward currents would be increased. This would increase the velocity of the downward current to some extent.

"Justice" very correctly remarks that the burning out of the tubes "is consequent upon the isolation of the metal from the water." A tube will therefore be burned out three times as soon in the boilers of the Egyptian steamer as they will in those of the *Mississippi*. It will be observed, by reference to the engraving, that the shell of these latter are far enough above the top of the tubes to permit of the withdrawal of a damaged one, and the insertion of new within the boiler, while such is not the case with those of the Egyptian steamer, as will be readily seen by reference to the sketch given in "Honesty's" article, in the March number of the MAGAZINE. Plugging up a tube which has given out is not repairing it, and as nothing else can be done with these, I would like to ask—where is the facility for repairs? and what will you do when they are all plugged up?

With regard to the necessity, or even advantage, of giving a greater heat to the upper ends of the tubes than we do to the lower, from the fact that there is more water in contact with the tubes at the lower end than at the upper, it would appear reasonable to suppose that if there was *any* inequality, the greatest heat should be at the lower ends, as, whatever the disposition, there is a fixed amount of heat acting upon the tube in the aggregate, and when a heat so great that, if it is applied to the lower end of the tube, it will drive all the water out of it, is applied to any part of the tube, it is not going to last long.

By reference to the illustration in "Honesty's" article, it will be observed that there are two crowns over one grate, and that where they join they come nearly down to the top of the fire. We are told, in the description, that this critical surface is to be supplied with water through the opening into the water-space at the back; that is to say, water is to flow horizontally along the hottest surface in the boiler, for more than 10 feet, without rising even one inch; for if it should refuse to do this, there would inevi-

tably be steam on one side of the plate, and glowing coals almost touching and immediately beneath the other. The sides are in nearly as bad a situation, sufficiently so to prevent their duration long enough to learn whether the tubes will require "plugging."

Martin's boiler has been criticised as being too high. I wish to draw attention to the Montgomery boiler in this respect, as compared with Martins. "Honesty" says those which he sketches are 12 feet high, but it will be observed that this height is from the grate up. The boilers must be raised sufficiently to get an ash-pit of 2 feet under the grate; at the top he has neither space to withdraw a tube, nor furnish sufficient steam capacity. The boilers of the *Mississippi* are 12 feet 2 inches high, including ash-pit and space above to withdraw a tube, and furnish ample steam capacity, besides giving plenty of room to expand a tube into the lower sheet when required. Indeed, no boilers have ever been put in a ship, which offer greater facilities for cleaning and repairs than those of Martin—an assertion which I challenge "Justice," or any other *savan* to disprove, while the tubes of the Montgomery type cannot be conveniently cleaned, for the same reason that they cannot be withdrawn; and as for the scale side of the crown-sheets of his furnaces, they are out of reach. If their design was as excellent as the workmanship upon those individually in question, "L'Clair" would have no need to fear for the reputation of "American genius." As it is, I believe I have shown the fallacy of the most important of the erroneous arguments, and the errors of some of the more important assertions made by "Justice;" and in conclusion, I beg permission to advise him that when he opens his battery by a lecture on "the first principles of rhetoric," and the "golden rule of debate," he should not make voluntary attacks in a ridiculous manner, and thus violate his own precepts in the same article in which they are written.

SENECA.

THE MARINE ALGAE.

BY WILLIAM HENRY HARVEY.

Continued from page 52.

THE FROND.—The *frond* or vegetable body of the compound Algæ puts on a great variety of shapes in different families, as it gradually rises from simpler to more complex structures. In the less organized it consists of a string of cells arranged like the beads of a necklace; and the cells of wh such strings are composed, may be either globose or cylindrical. I former case we have a *moniliform* string of *filament*, and in th filiform or cylindrical one. The term *filament* (in Latin; menly applied to such simple strings of cells, but has occas

acceptation, signifying any very slender, threadlike body, though formed of more than one series of cells. This is a loose application of the term, and ought to be avoided. By Kutzing the term *trichoma* is substituted for the older word *filum* or filament. Where the *filament* (or *trichoma*) consists of a single series of consecutive cells, it appears like a jointed thread; each individual cell constituting an *articulation*, and the walls between the cells forming *dissepiments* or *nodes*, terms which are frequently employed in describing plants of this structure. Where the filament is composed of more series of cells than one, it may be either *articulated* or *inarticulate*. In the former case, the cells or articulations of the minor filaments which compose the common filament are all of equal length; their dissepiments are therefore all on a level, and divide the compound body into a series of nodes and internodes, or dissepiments and articulations. In the latter, the cells of the minor filaments are of unequal length, so that no articulations are obvious in the compound body. In *Polysiphonia* and *Rhodomela* may be seen examples of such articulate and inarticulate filaments.

By Kutzing the term *phycòma* is applied to such compound stems; and when the phycoma becomes flattened or leaf-like, a new term, *phylloma*, is given to it by the same author. These terms are sometimes convenient in describing particular structures, though not yet generally adopted. The cells of which compound stems (or *phycomata*) are composed are very variously arranged, and on this cellular arrangement, or internal structure of the stem, depends frequently the place in the system to which the plant is to be referred. A close examination, therefore, of the interior of the frond, by means of thin slices under high powers of the microscope, is often necessary, before we can ascertain the position of an individual plant whose relations we wish to learn. Sometimes all the cells have a longitudinal direction, their longer axes being vertical. Very frequently, this longitudinal arrangement is found only towards the centre of the stem, while towards the circumference the cells stand at right angles to those of the centre, or have a horizontal direction. In such stems we distinguish a proper *axis*, running through the frond, and a *periphery*, or *peripheric stratum*, forming the outside layer or circumference. Sometimes the axis is the densest portion of the frond, the filaments of which it is composed being very strongly and closely glued together; in other cases it is very lax, each individual filament lying apart from its fellow, the interspace being filled up with vegetable mucus or gelatine. This gelatine differs greatly in consistence; in some algæ it is very thin and watery; in others it is slimy, and in others it has nearly the firmness of cartilage. On the degree of its compactness and abundance depends the relative *substance* of the plant; which is membraneous where the gelatine is in small quan-

tity; gelatinous where it is very abundant and somewhat fluid; or cartilaginous where it is firm.

The frond may be either cylindrical or stem-like, or more or less compressed and flattened. Often a cylindrical stem bears branches which widen upwards, and terminate in leaf-like expansions, which are of various degrees of perfection in different kinds. Thus sometimes the leaf, or *phylloma*, is a mere dilatation; in other cases it is traversed by a midrib, and in the most perfect kinds lateral nervelets issue from the midrib and extend to the margin. These leaves are either vertical, which is their normal condition, or else they are inclined at various angles to the stem or axis, chiefly from a twisting in their lamina, the insertion of the leaf preserving its vertical position. They are variously lobed or cloven, and in a few cases (as in the *Sea Colander* of the American coast) they are regularly pierced, at all ages, with a series of holes which seem to originate in some portions of the lamina developing new cells with greater rapidity than other parts, thus causing an unequal tension in various portions of the frond, and censequently the production of holes in those places where the growth is defective. Such plants, though they form lace-like fronds, are scarcely to be considered as net-works. Net-like fronds are, however, formed by several Algæ where the branches regularly anastomose one with another, and form meshes like those of a net. Most species with this structure are peculiar to the Southern Ocean, but in the waters of the Caribbean Sea are found two or three which may perhaps yet be detected on the shores of the Florida Keys. In one of the Australian genera of this structure (*Claudea*) the net-work is formed by the continual anastomosis of minute leaflets, each of which is furnished with a midrib and lamina. The apices of the midribs of one series of these leaves grow into the dorsal portion of leaves that issue at right angles to them, and as the leaves having longitudinal and horizontal directions, or those that form the warp and weft of the frond, are of minute size and closely and regularly disposed, the net-work that results is lace-like and delicately beautiful.

In the *Hydrodictyon*, a fresh-water Alga, found in ponds in Europe and in the United States, where it was first detected by Professor Bailey, near West Point, a net-like frond is formed in a different manner. This plant when fully grown, resembles an ordinary fishing net of fairy size, each pentagonal mesh being formed of five cells, and one cell making a side of the pentagon. As the plant grows larger, the meshes become wider by the lengthening of the cells of which each mesh is composed. When at maturity, the matter contained within each cell of the mesh is gradually organised into granules, or germs of future cells, and these become connected together in fives while yet contained in the parent cell. Thus mesl first, and at length little microscopic net-works, are formed within

cell of the meshes of the old net; and this takes place before the old net breaks up. At length the cells of the old net burst, and from each issues forth the little net-work, perfectly formed, but of very minute size, which, by an expansion of its several parts, will become a net like that from which its parent cell was derived. Thus, supposing each cell of a single net of the Hydrodictyon were to be equally fertile, some myriads of new nets would be produced from every single net as it broke up and dissolved. In this way a large surface of water might be filled with the plant in a single generation.

The manner of growth of the frond is very various in the different families. In some, the body lengthens by continual additions to its apex, every branch being younger, the further removed it is from the base; that is, the tips of the branches are the youngest parts. This is the usual mode of growth in the Confervoid genera, and also obtains in many of those higher in the series, as in the Fucaceæ and many other Melanosperms. In the Laminariæ, on the contrary, the apex, when once formed, does not materially lengthen, but the new growth takes place at the base of the lamina, or in the part where the cylindrical stipe passes into the expanded or leaflike portion of the frond. In such plants the apex is rarely found entire in old specimens, but is either torn by the action of the waves or thrown off altogether, and its place supplied by a new growth from below. In several species this throwing off of the old frond takes place regularly at the close of each season; the old lamina being gradually pushed off by a young lamina growing under it. There are others, among the filiform kinds, in which the smaller branches are suddenly deciduous, falling off from the larger and permanent portions of the trunk, as leaves do in autumn from deciduous trees. Hence specimens of these plants collected in winter, are so unlike the summer state of the species, that to a person unacquainted with their habits, they would appear to be altogether different in kind. The summer and winter states of *Rhodomela subfusca* are thus different. In *Desmarestia aculeata* the young plants, or the younger branches of old plants, are clothed with soft pencils of delicate jointed filaments, which fall off when the frond attains maturity, and leave naked, thorny branches behind. Similar delicate hairs are found in many other Algæ of very different families, generally clothing the younger and growing parts of the frond; and they seem to be essential organs, probably engaged in elaborating the crude sap of these plants, and consequently analogous to the leaves of perfect plants. This is as yet chiefly conjectural. The conjecture, however, is founded on the observed position of these hair-like bodies, wnich are always found on growing points, the new growth taking place immediately beneath their insertion. In most cases these hairs are deciduous; but in some, as in the genus *Dasya*, they are

persistent, clothing all parts of the frond so long as they continue in vigor. They vary much in form, in some being long, filiform, single cells; in others, unbranched strings of shorter cells, and in others dichotomous, or, rarely, pinnated filaments.

(To be continued.)

"L'CLAIR" ON VERTICAL TUBULAR BOILERS.

Messrs. Editors:—In your March number we find two articles upon the subject of "Vertical Tubular Boilers"—one, a disquisition upon the "best marine boiler, the other, a plan of what we suppose to be the same boiler, although an effort of the imagination is required to apply the deductions of one to the plan of the other. "Justice" has summed up, in a few pages, what he thinks should have been a volume, and claims to have "accounted for results known to be facts, by deducing them from first principles." He has seen certain of these boilers in practical operation, and believes them possessed of all the requisites for a good steam generator. We, too, have seen these boilers in practical operation, and witnessed their irretrievable failure as marine boilers, "consequent upon postulates which cannot be disputed." His objection to my "grotesquely ill-chosen" cognomen simply means that he has selected one exquisitely appropriate. Whilst his "volume" in epitome is a complacent vindication of truth (?) and "Justice," brimfull of profundity, it has completely *asphyxiated* the subscriber. But I am willing to concede that he has written in all "candor," and whilst the "accuracy of his reasoning" is a matter of opinion, an air of coolness pervades the whole, that is quite refreshing.

In the entire absence of satisfactory evidence of the practical success of these boilers, it seems rather a useless waste of "powder" to enter into a theoretical discussion upon a mere assumption of results that *should* follow a particular theory. Practical demonstration will be more acceptable than superfine speculation. Whilst it is an easy matter to build the "best marine boiler" upon paper, but not so with reference to the application of such designs in actual practice.

With regard to the fact that Mr. George A. Stone "deliberately," and "to the disgust of his consulting engineers," set aside a boiler, partially completed, with a preference to those of the plan shown by "Honesty," we can only extend him our sympathy, believing him to be a very clever gentleman, whilst the fact argues nothing, except the probability that the Egyptian steamer will present additional evidence of the success attending ship-owners and Captains who aspire to become naval architects and engineers.

If these are the boilers recommended "by men whose enlightenment might be represented by infinity as a base and that of 'L'Clair' as a constant multiplier," we fancy ourself an infinitesimal, and so inconceivably small that a forty-million magnifier could not discover our identity. However, if that is the "best marine boiler," let us add another clause to the Litany, and say—"Good Lord deliver us from a bad one." Whatever may be the relative merits of these boilers, they are certainly entitled to our respectful consideration as a very great curiosity.

Some of the principal objections to these boilers are fully set forth in your journal of September, 1855, by a writer over the signature of "Correspondent." He says: "Mr. Martin claims, in his specification, that, by removing the furnaces from the vertical side of the boiler, and transferring it to the bottom side, or under the lower ends of the tubes, that in so doing he removes the tubes from the direct action of the heat. Now it must be seen *that the contrary is the case*, as any one of capacity in this branch of engineering will not fail to see that the *proper place* for the furnaces *is at the side named*." Again, speaking of the same boiler, he says: "Nor does he stop here; for, as if this absurd arrangement was not sufficient, he now erects the boiler *upon stilts*, in order that he may cut off the furnaces from the proper places, as shown, and put them underneath the boiler, thereby elevating the boilers some *six or seven feet* higher than is necessary. By inspecting the plan as given by "Honesty," the force of these objections becomes apparent. The height of these boilers is stated to be twelve feet, and allowing two feet for ash-pits, the total height will be *fourteen feet*. Now the boilers of the *Merrimac* and *Minnesota*, vessels of about 3500 tons, are 11 feet 3 inches, exclusive, and fourteen feet inclusive of the steam chimney, which is independent of the boiler, the height being equal to the steam chimney of one, whilst the *top of the boiler* in the other case would be exposed; therefore, if the height is objectionable in the former case, it is an absolute defect in the latter. "O Consistency! thou art a jewel!"

In all candor, we believe that "Justice" and his friends should be thankful that an opportunity has been afforded them to prove the fact that they are not stumbling-blocks in the way of improvement, that they either possess or advocate an invention having undoubted merit, and not simply attributes fully developed in other and more successful inventions. We desire something tangible—some evidence of especial superiority; even give us a peg upon which to hang a favorable opinion, and we will unhesitatingly place one there.

Freely admitting the assumption that vertical tubular boilers are, for obvious reasons, the best form—why are some particular forms successful, and others quite the contrary? This kind of boiler is by no means a new

thing; for more than ten years it has been prominently before the country, and it must have had some good qualities to induce inventors to improve upon it. At the same time, it is fair to presume it was objectionable, in consequence of some radical defect, otherwise it would have been adopted in the form so energetically recommended.

These boilers have been sufficiently used to make a *record* of some kind, and we, who are in pursuit of information, wish to be enlightened with reference to actual performances, instead of theoretical deductions. Prove to us that we are not discussing inventions destitute of merit, and which have not been superseded by others known to be susceptible of general application, otherwise the conclusion is obvious, that all efforts to bolster up tottering concerns indicate a disposition to crush meritorious inventions, simply because abortive attempts have failed.

However, we are not disposed to underrate the efforts of Steenstrup, Nott, Napier, Dundonald, Montgomery, and a host of others. If they have failed in the accomplishment of a purpose, we can but regret their misfortune. Their labors, although of little practical value, were nevertheless in the right direction, and foreshadowed more useful inventions. Projectors of new inventions are entitled to our respect, whilst they challenge our sympathy; —our respect, because the tendency of their labors lead to the final development of useful improvements—our sympathy, if from want of judgment, experience, practical ability, and other essential qualifications, they are unsuccessful, the individual suffers in consequence of such failure. But if a man attempts an improvement and fails, and another, possessing the requisite qualities, makes the trial and succeeds, how should we regard the former if he were to disparage the latter, and endeavor to deprive him of all credit appertaing to his invention, on the plea of *priority*?

The claim to priority of invention should have reference to success. Many of the most useful of modern improvements, whilst in the hands of original projectors, were justly considered abortions, and perhaps would have remained as such, but subsequently, under the direction of competent persons, established a reputation upon positive merit.

Engineers, as a body, have been divided into three classes—*theoretical engineers*, or those who, by study or reflection, have become familiar with the rules or maxims, and technicalities of the profession; *mechanical engineers*, who confine their attention and devote themselves exclusively to the mechanical part of the trade; and *practical engineers*, who have no other or better guide than their own experience in either branch of the profession. Without conceding a limit to the required knowledge of an engineer, in a general acceptation of the term, he should be an embodiment of all these; for our best engineers are doubtless those who combine, with undoubted skill and ability, the greatest amount of theoretical information. But to

the three classes aforesaid a fourth must be added—that of *amateur engineers*, destitute alike of theory and experience, and who scorn to profit by either, deeming themselves, in their own self-sufficiency, equal to the accomplishment of any speculative invention.

The immortal Watt no sooner proclaimed his great inventions to the world than he was beset with *soi-dissant* engineers, who seized upon the current products of his genius, as fruitful subjects upon which to base their operations, and we venture the assertion, which we believe records will sustain, that eight-tenths of all the engineering blunders committed since his advent can be traced directly or indirectly to this class.

Unfortunately, at an early period in the "Age of Steam," tubular boilers of all kinds were taken under the patronage of the "Amateurs," and consequently were discarded by *bona-fide* engineers, although they may have been aware that some of these ill-advised arrangements possessed the elements of success. In England, various plans for vertical tubular boilers have been proposed and patented. The best is that of the Earl Dundonald (who, by the way, is an illustrious type of the *fourth class* of engineers,) but, for reasons above stated, English engineers gave his invention the "cold shoulder," and it is only since American engineers have demonstrated the economic value of this kind of boiler, that they have discovered his invention is not without merit, at least sufficient to claim the credit of original suggestion. The boiler of Dundonald, although badly constructed, and arranged upon erroneous principles, contained the germ of a useful invention; but he no sooner pocketed his "letters patent" than he was off in search of new discoveries, and the last we hear of him is having finished the expenditure of a large amount of government money upon a *rotary* screw engine, for the sloop *Janus*, but which, in imitation of the donkey, "*wouldn't go.*" *Vive la Amateurs!*

There is no doubt but that personal prejudice, individual interest, prospective monopoly, and as well, the absence of a true spirit of liberality among engineers as a body, present obstacles in the way of improvement frequently fatal to inventions of real merit. But the man who, in the face of all opposition, by untiring industry, and indomitable perseverance, fully establishes the success of an invention, beyond the possibility of a doubt, leading to its development and useful application, thereby benefiting mankind, is entitled to more credit than belongs to thousands of inventions scarcely known outside the precincts of the patent office.

If there is any truth or justice in the foregoing remarks, we can but date the successful introduction of vertical tubular boilers with the advent of the Collins line of trans-Atlantic steamers. Since that time they have been modified and improved, and are now fully and freely admitted into the brotherhood of approved boilers.

To what extent the *fourth class* of engineers have been instrumental in developing boiler improvements in this country, we leave others to determine. We can only repeat, in conclusion—"by their fruits ye shall know them." L'CLAIR.

THE SCREW PROPELLER.

BY ALBAN C. STIMERS.

IN a former article*—intended as the first of a series which should discuss the whole subject—there was shown among other things the loss of power applied, due to the oblique action, with screws of various pitches, and, that the less the pitch compared with the diameter of the centre of effect, the less would be such loss. I had intended in my second paper to exhibit the practical difficulties in the way of making this loss so small as to be unimportant. To do this, however, in a manner which shall render it unnecessory to go over the same ground again, requires three items of data, of undoubted accuracy, which I was unable to find. In the arrangements of some of our new frigates, we may ultimately hope to obtain two of them; but as it is uncertain *when*, I shall, for the present, merely state generally what those practical difficulties are and their extent, as near as I can form an opinion from what has already been learned and written upon the subject.

The three items of data upon which information is required, are—

First, the friction of the engines.

Second, the dynamic thrust of the screw, with the power of the engines at the time of observation, from engines of known friction.

Third, the friction of the load.

This last cannot be obtained from marine engines; but as the per centum of the friction of the load of similar machinery must necessarily be the same, it can be obtained from stationary engines which are performing a known useful result, as for instance: engines which are used for pumping water to a certain height. Thus, if we ascertain the power required to run the engine and pumps when they are not pumping, and afterwards that required when they are pumping, the amount pumped and the height to which it is pumped being recorded, we can find how much the power applied to the piston, exceeds that formed by multiplying the weight of water into the height to which it is raised, and all that this difference is in excess of the friction of the machinery, must necessarily be the friction of the load.

* Page 168, volume v., this Magazine.

Neither this nor any other satisfactory method has been followed for obtaining this very desirable information that I can learn, engineers having contented themselves with *estimating* the per cent—some counting it as being equal to five and others to ten per cent of the gross power. To show the manner of applying this to the development of the proper proportions of the screw propeller, I will give what I consider the directions in which the power applied to the piston of screw engines is expended, viz:

1st. Utilized in propelling the vessel.

2nd. Lost by the oblique action of the blades.

3d. " by unloaded friction.

4th. " by the friction of the load.

5th. " by the resistance of the cutting edges and the friction of the screw blades upon the water.

I am aware that the two most prolific writers on the screw propeller in the English language—viz: Bourne and Isherwood—tell us that there is another important source of loss—the loss by slip—equal in its per centum of the whole power exerted to the per centum of the slip itself. But with all due respect to the fact that the former of these writers has written and published a large quarto "Treatise on the Screw Propeller," and that the latter has written many able articles on the same subject, I consider them both in this respect radically in error. The former of these writers gives us in the most dogmatic manner, his crude notions as facts, and apparently takes it for granted that he will be universally believed, or if he attempts to give reasons for his position, they are so shallow and loose that the merest novice, if he can only overcome the great respect for the writer which the publication of such a splendid volume usually excites, can see the fallacy of them.

The latter fortifies his position with a course of reasoning at once so subtile and so profound, that the best logicians in the profession are oftentimes unable to point out exactly where his faults lie, even when they know him to be in error.

I made some remarks upon this subject in my first paper; but as I consider it a very important point, I will give Mr. Isherwood's arguments in favor of the position usually assumed by most engineers, and endeavor to show wherein they are unsound. They occur in an article on the "Experiments on Screw Propellers in H. B. M. Steamer *Minx*," published in the *Franklin Journal*, in the latter part of 1853. "Now as slip is a measure of the loss of useful effect, that loss should be in the direct ratio of the slip, as will appear from the following considerations. As pressure and resistance are equal and in opposite directions, a pressure equal to the resistance of the vessel is always experienced by the water on which the screw acts propulsively; but the amount of power expended, is propor-

tional to the resistances moved and the distances through which they are moved in the same time. Now supposing the screw to slip or recede one fourth of its pitch per revolution by the yielding of the water on which it acts, that is to say, that per revolution it moves the vessel through but three-fourths of its pitch, instead of through the whole pitch, as it would do were there no slip, and as pressure and resistance are equal and in opposite directions, there is the same pressure exerted by the screw upon the receding water as there is exerted by it on the advancing vessel; but in the supposed case of slip, the water acted on or passed by the screw, is moved a distance that can be represented by 1, in the same time that the vessel is moved a distance that can be represented by 3, the whole distance moved being represented by 4, equal to the pitch of the screw.

"Calling the pressure on the engine piston 1, the total power developed by the engine can be represented $1 \times 4 = 4$, of which $1 \times 1 = 1$ represents the amount expended on the slip or one-fourth, while $1 \times 3 = 3$, represents the amount expended in overcoming the resistances of the vessel, or three-fourths of the total power developed. It is thus plain that the loss of useful effect caused by the slip, is the slip.

"It must be distinctly understood that the loss of useful effected *caused* by a slip of 25 per cent, is 25 per cent of the gross or total power developed by the engines, and not 25 per cent of what remains of the total power after deducting those fractions of it required for working the engines alone, and overcoming the friction of the load; for it is evident that at each revolution, 25 per centum of the power required for working the engines alone, 25 per centum of the power required for overcoming the friction of the load, 25 per centum of the power required for overcoming the friction of the screw-surface on the water, and 25 per centum of the power required for propelling the simple hull, making a total of 25 per centum of the whole power developed by the engine, is lost by slip; for by consequence of the slip, each of these fractions or divisions of the total power has to be exerted 25 per cent longer to produce the same result, that is to cause the vessel to go the length of the pitch, instead of the length of three-fourths of the pitch, than would be required were there no slip, and although to make a revolution in the same time with slip, requires less piston pressure than to make the same revolution without slip, yet the useful effect will also be proportionably less, as the vessel will be in the same time through a less distance by the amount of slip. T the same useful effect, that is, to drive the vessel through equ in equal times, the engines in the case of slip must be worked tionably higher speed, which again requires a higher piston that to drive the vessel equal distances in equal times with slip, the piston pressures will have to be the same; but the

engine and consequently the power exerted, must be greater in the direct proportion of the slip."

It will be observed that he commences with a matter-of-course assertion that the "slip is a measure of the loss of useful effect," and only considers it necessary to prove that the "loss should be in the direct ratio of the slip," and if the reasoning of this proof were sound, the first assertion would be true, but if on the contrary it cannot be proved by sound reasoning, the first position, that slip is a loss of useful effect, must be given up, and it must be admitted that there is no loss whatever by slip.

He makes out very clearly at first that if the water is moved a distance of 1, and the vessel a distance of 3, the power which has been expended on the screw, may be called 4, it is not until he tells us that the 1 is lost and the 3 only is beneficially expended, that he departs from mechanical truth. His statement that "$1 \times 1 = 1$ represents the amount expended on the slip or one-fourth, while $1 \times 3 = 3$ represents the amount expended in overcoming the resistances of the vessel, or three-fourths of the total power developed," and that "it is thus plain that the loss of useful effect caused by the slip, is the slip," is mere assertion, and amounts to nothing as proof; up to this point, he has proved nothing one way or the other. He then shows very correctly that if 25 per cent of the power applied to the screw were lost by slip, it would be 25 per cent of the gross power on the pistons; that done, he makes an admission which destroys his whole argument: he says that, "and although to make a revolution in the same time with slip, requires less piston pressure than to make the same revolution without slip, yet the useful effect will also be proportionably less;" that is to say, the loss of useful effect will be in the same ratio with the decrease in the pressure, which is precisely no loss at all, as power is measured by the pressure multiplied into the space through which it is exerted, and if the pressure is decreased from 4 to 3 and the distance increased from 3 to 4, no loss of power is sustained, and by his own admission this is actually what takes place in the case of slip. He then goes on to say, "To obtain the same useful effect, that is, to drive the vessel through equal distances in equal times, the engines in the case of slip, must be worked at a proportionably higher speed." This is only a repetition of what is stated above; that is, the distance through which the pressure acts is increased from 3 to 4, and consequently the pressure is reduced from 4 to 3; but he says in continuation, "which requires a higher piston pressure," an assertion contrary to the laws of mechanics.

To exhibit this clearly, let us suppose that the vessel is being propelled by a screw which slips 25 per cent, and the engines are making 40 revolutions per minute, with a mean effective pressure of 30 lbs. per square inch, and while so running it suddenly becomes possible for the screw to

drive the vessel without slip, the speed, and consequently resistance, remaining unchanged, the pressure with which the screw was forced against the water, would also remain the same; but while exerting the same pressure, it could only revolve 30 revolutions per minute, instead of 40, as before, and this decrease in the revolutions from 40 to 30 per minute, would cause the steam to increase directly from 30 to 40 lbs., and the balance would be restored, the same power being exerted by 40 lbs. and 30 revolutions per minute, as by 30 lbs. and 40 revolutions, and as by hypothesis the speed of the vessel remained the same, the change from 25 per cent slip to none at all, would cause neither loss nor gain.

The advocates of the theory that slip is a loss of power, obtain the amount "utilized in propelling the vessel" by multiplying the pressure in pounds shown by the dynamometer into the speed of the *vessel* in feet per minute and divide by 33,000. It of course follows from this, that when a vessel encounters a gale of wind sufficiently strong to prevent her advance, no portion of the power exerted is utilized; and if the gale should increase in force, working the engines would only increase the speed with which she would drift, the absurdity of which is obvious. The true method is to multiply the pressure in pounds shown by the dynamometer into the speed in feet per minute with which the screw has receded from the water upon which it acts—in other words into the product of the pitch and the revolutions per minute and divide by 33,000.

To return to the relations of the pitch and diameter of the centre of effect. If we could obtain the amount of power in the first four items given, what remained would necessarily be the amount consumed by the fifth. Now this varies also with different proportions of pitch to diameter of centre of effect, but in the opposite direction from that of the oblique action, the greatest loss being sustained by the finest pitch. If the necessary data were at hand, we might construct a table showing the loss in each of the directions, as the relative pitch was gradually reduced, and when we reached the point where their *sum* commenced to increase, we should have the proportion of pitch to diameter of center of effect which would sustain the minimum of loss, or in other words give the maximum of beneficial effect.

Having, however, to rely upon rather uncertain information upon those points, it is necessary to *assume* what this ratio will probably be, and as I shall in my future arguments be on the safe side by assuming a ratio which will perhaps be a little greater than the true one, I shall take the relation of 1 1-2 of pitch to 1 of diameter of centre of effect as the best proportion for propelling purposes.

To reduce the pitch of the screw, in its present most popular form to this ratio, would, I am well aware, require an objectionable velocity of

engines when connected direct to the screw-shaft. I am also aware that the greater space occupied by, and greater first cost of geared engines, will always be an objection to their use. I propose, however, to *increase the diameter of the centre of effect.* The result of this will not only be advantageous in transmitting a greater per centum of the power of the engines for the propulsion of the vessel, but will also enable us to give the screw greater propelling power when the vessel is moving slowly through the water against great resistance, as in strong head winds, where, as is well known it is now decidedly deficient as compared to the paddle-wheel.

The centre of effect of the screw may be increased by

1st. Enlarging the screw itself.

2nd. Enlarging the diameter of the hub.

3d. Making it longer at the periphry than it is at the hub.

4th. Giving it a radial expansion of the pitch.

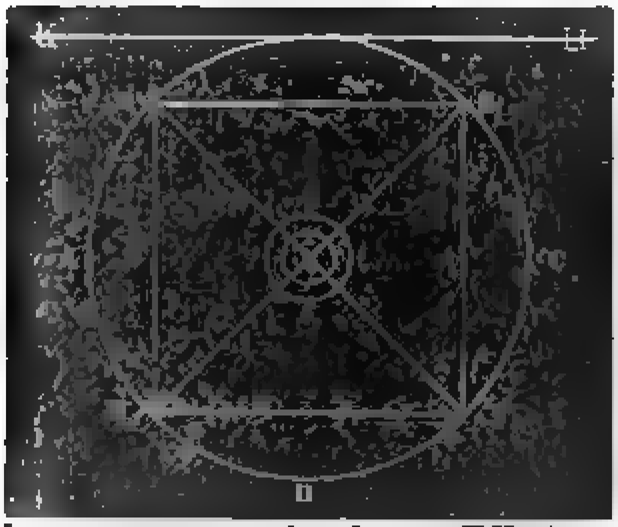
The difficulty has usually been with experiments made upon the screw propeller; that any departure from a fully submerged true screw of uniform length and hub, just sufficient for strength, has been carried too far in one direction, so much so as to lose by the vicious exaggeration more than was gained, and causing a necessity for a return to the original true screw, with a full belief on the part of many of the most able inquirers, both in this country and in Europe, that it is theoretically, as well as (as they assert it has been proved) practically, the best form. There are practical and theoretical limits to the extent to which each of the above four changes can be carried. Indeed, so much are we confined in this respect, that when we have applied *all* the above expedients to our screw, it will not appear so different from the common screw now most in use, as many that are being extensively introduced under the *eclat* of patents, high sounding theories and peculiarities of construction.

Upon the increase of Diameter.

The most popular mode of placing the screw at present, is to continue the keel beyond the stern post far enough to give space for the revolution of the screw, and connect the after end of it to the overhanging stern above, by a rudder post, to which is attached the rudder in the same manner as to the stern post of a sailing vessel or paddle-steamer. As in this country almost all our ships are built of wood, I shall confine my remarks entirely to them. This part of the keel, then, which forms the bottom of the rectangular hole in which the screw is placed, limits the depth to which the diameter may be carried, and as it is considered that to be effective, the screw must be entirely submerged, the surface of the water limits the direction upward. Take the case of a vessel drawing 18 feet of water. The keel of such a vessel would be about 18 inches deep. There must be 6

inches clearance between the priphery of the screw and the top of the keel, thus leaving 16 feet as the diameter of screw which may be applied.

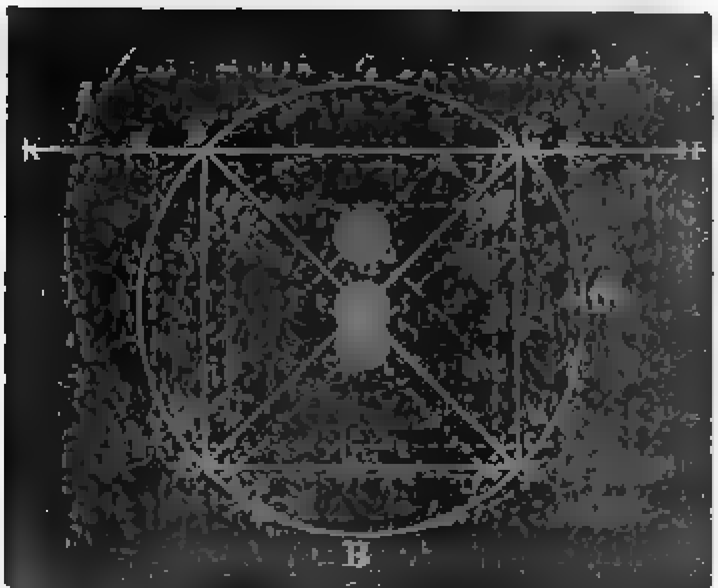
Now any modification which will permit us to enlarge the diameter by carrying the lower edge farther down, will manifestly be more advantageous than carrying the upper edge out of water, as we shall not only keep the screw entirely submerged after the increase, but we shall be acting upon water which has been less disturbed by the passage of the vessel, and which possesses greater resistance to movement on account of its greater depth. I propose to accomplish this by the entirely practical method of replacing this wooden connection between the stern and rudder-post with metal. In our naval vessels this would require to be of bronze—the same as the screw—which is enough stronger than oak to permit us to reduce the depth from 18 to 4 inches. This diminution in the depth of keel beneath the screw, enables us to decrease also the clearance from 6 to 2 inches, which will add 18 inches to the diameter of our screw, making it 17 feet 6 inches in diameter. Retaining the lower edge at the same depth, any further increase must necessarily bring a portion of the screw out of water. This has been done to such an extent on our western lakes, that the shaft has been brought entirely above water, and perhaps the advantage of using a large diameter, cannot be better shown than by simply stating that experience has proved there, that the larger the diameter, the higher the speed which was attainable. Practically, these great diameters prove unwieldly, so far astern, a slight pitching in a sea-way making a very great difference in resistance which is brought upon the engines, and as the lateral thrust is all in one direction, difficulty is experienced in steering, besides which, as constructed there—the greater the diameter, the greater the number of blades—they proved enormous weights to be carried at the extreme end of the vessel. These three objections, which are all indebted for their force to the great extent to which the improvement was carried, have made them unpopular of late, so much so, that their originator, Mr. H. O. Perry, of Buffalo, has been compelled to entirely submerge his screws, although fully aware himself, that to do so, is to go backward, as far as getting the best propelling effect is concerned. This, however, is only one of the instances already referred to, where an improvement has been carried so far that the accompanying advantages entirely overbalanced the advantages, and without investigating to learn whether a moderate departure from the established screw would have been beneficial, a return to the starting point has been demanded. I propose to examine this subject sufficiently to show the limit beyond which the diameter ought not to be increased.



The circular direction through which each point in the screw-blade passes in each revolution may be resolved into four, that is, for the purposes of this demonstration, we may suppose that the point in the periphery which passes through the circle A, B, C, takes the directions DE, EF, FG and GD, HK is the surface of the water. Now, owing to the fact that the water has greater resisting powers at the depth EF than at GD, there is, with a fully submerged screw, a tendancy to propel the ship in a circle which has to be overcome by the rudder. The resistance while passing through the direction DE, is, however, much greater than that in any other, as has already been explained,* and if by enlarging the diameter, we increase the length of this line, and consequently this greatest resistance in the same ratio that we do the line EF, we shall gain in efficiency in as much greater ratio than the tendency to propel the vessel from a straight course as the resistance in the direction DE, is greater than that in the direction EF, less the increase which is added to the difference of EF and GD, by the upper portion of the screw coming above the surface of the water. It is not necessary for my present purpose to show how much this is, even if it could be satisfactorily done; but it will be evident that when, by enlarging the diameter, we decrease that portion of DE, which is in the water while EF continues to increase and GD, to decrease, we have reached the limit beyond which the attending evils of large diameters will weigh down their advantages.

In the following diagram, the small dotted circle and lines show the fully submerged screw. The full lines exhibit the diameter increased until GD, comes to the surface of the water. It will be observed that each of the lines DE, EF, and FG, have received an equal addition, and only GD has been diminished in force, and that but slightly, by having a portion out of water. Any increase beyond this, will decrease that portion of the vertical lines which are in the water, while the horizontal line, *e f*, of the large dotted circle increases in the same ratio with the diameter, while the upper quarter rapidly diminishes, thus increasing the propelling effect of the screw only at that part which gives all the trouble in steering, and indeed transferring to this portion a part of the direction, G. F. and

*Page 192, vol. V.



DE, I think it will be clear without further demonstration, to any one who will examine the subject, that the circle ABC presents the limit to the enlargement of the diameter. I find that when we have 17 feet 6 inches depth for the screw below the surface, we can employ one of 20 feet 8 inches diameter, and not exceed the above practical limit. This will strike those conversent with the screw as now used, as extremely large; but let them compare it with the paddle-wheels for the same class of vessels. They would be each 30 or 35 feet in diameter. Our object in enlarging the diameter, was to increase the diameter of the centre of effect. A true screw of 16 feet diameter, of uniform length and pitch, with a hub of just sufficient size for strength, would be 11.4 feet. That of 20 feet 8 inches diameter, and dipping 17 feet 6 inches, would be 14.38 feet. If we retain the same immersed surface in each case, the propelling power with the same amount of slip, will be as the squares of the diameters of the centres of effect. That is, as 11.4^2 is to 14.38^2, or, as 1.00 is to 1.59.

ERRATA.—We must ask the indulgence of our readers for the typographical errors appearing in an article on "Screw Steamers" in our April number:

On page 61, on the 8th line from the top, please read *packing* for planking.

On page 62, on the 16th line, please read *A, B, C, and D,* for A, B, and C.

On page 63, on the 6th line from the *bottom*, please read *overcoming* for increasing.

On page 64, on the 14th line from the top, please read, "but in regard to the *auxiliary* war steamers," &c., for "but in regard to the war steamers.

We regret this necessity, but it will occur sometimes.

IMPROVEMENT OF THE CHANNEL OVER THE ST. CLAIR FLATS

THE improvement of the channel over the St. Clair Flats is one of the most important works of Topographical Engineering projected for the relief of navigation on our great western lakes. The route over these Flats has become a very extensive commercial thoroughfare, in which the interests of the cities and states of the north-west are deeply involved. To Col. J. D. Graham, the able and vigilant Superintendent of Public Works for the Western Lakes, we are indebted for a copy of the following official Report respecting the improvement of this channel, which we lay before our readers. It will be found to communicate valuable and complete information upon the subject.

Report of Brevet Lieutenant Col. J. D. Graham, Major Corps of Topographical Engineers, made to Col. J. J. Abert, Chief Topographical Engineers, on the improvement of the navigation over the St. Clair Flats, Michigan, including the operations for that object for the year 1855, *and recommending a plan, with estimates, for future operations, together with statistics, showing the amount and value of the commerce and navigation which passed over these flats in the year* 1855, *and the importance of the improvement as a measure of military defence of the national frontier.*

The plans for this important improvement were first digested, and presented for consideration, by the late and much lamented Captain Augustus Canfield, of the corps of Topographical Engineers. It was after his death that my command was extended to embrace the Lake St. Clair harbor improvements.

The report of Captain Canfield upon this subject, dated Sept. 1, 1853, will be found in the printed Senate document, No. 1, (executive) of the 33d Congress, first session, part 3d, pages 145 to 150.

The action of the board of Topographical Engineers thereon will be found in the same volume, pages 208 and 209.

Captain Canfield's examinations and discussions were extended to three separate projects for cutting and preserving a ship channel through the "Flats" which obstruct the entrance of vessels drawing over six feet of water, into the South Pass of the river St. Clair. These were denominated the Eastern, the Middle, and the Western Channel of the South Pass. Separate estimates were presented by him, in detail, of the cost of opening a channel twelve feet deep through each of these approaches to the South Pass, both for a width of 300 feet and for one of 600 feet, in each case. He concludes by recommending to preference the adoption of the Middle approach or Channel to the South Pass, and that it should at first be opened to a width of 300 feet only, and protected on each side by piles one foot square, driven close together. He adds that the width of the channel-way

may easily be increased at a future time, should the requirements of navigation demand it.

This project was, after a full examination of the subject by the Board of Engineers, recommended for adoption, and it was adopted by the War Department, as the plan of improvement to be carried out. The cost of the improvement, to the extent above mentioned, was estimated by the Board of Engineers at the sum of $45,000.

This estimate was independent of the cost of a steam-power dredging-machine, which had already been constructed out of a previous appropriation. Such were the proceedings in behalf of this proposed improvement, before the subject became committed to my attention by the instructions of April 25, 1854.

No appropriation existed then, nor has any been granted since, for carrying on this work. In November, 1854, I inspected the locality, and found the depth of water, and the state of the obstructions to navigation, very much as they are represented in the survey of Captains Macomb and Canfield, made in November, 1852. A full report upon this inspection, and upon the condition of the public property appertaining to this improvement, was embraced in my general Report, No. 73, to the Bureau, of April 29, 1855.

In September, 1854, no appropriation having then been obtained for this work, the Board of Engineers made a second report, with a view, apparently, of reducing the estimates for it, so as to meet the means which it was proposed to raise by private enterprise for carrying it on. This reduction was based on a proposition to dispense with all structures (either close-piling or crib-work,) for the purpose of defending the sides of the proposed cut from being abraded, to the detriment of the channel-way, by the action of ice in winter, or by the wash of the lake-waves. This would leave the expense of the dredging alone to be provided for. The estimate for a channel-way 300 feet wide, presented by the Board, under this modified plan, was for $27,232, and for a channel-way, 600 feet wide, under the same system, $59,663. Even under this reduced system no appropriation was granted for this work.

I have not anywhere seen a statement, based upon real data, of the extent of the commerce whose prosperity and interests are actually involved in this improvement, and I do not think it has been fully appreciated. A proper understanding of it is essential, however, in connection with the discussions of the proper capacity and consequent necessary cost of the work. I have therefore spared no pains, nor have I begrudged any time that were necessary, in obtaining statistics showing the amount and ---'ne of this commerce during the period of navigation of the year 1[illegible] be ap-

posite to the discussion of some points which will be most respectfully submitted for consideration in connection with this subject.

On the opening of the season of navigation in the spring of 1855, the citizens of the chief commercial ports of the western lakes, most interested in the removal of the obstructions to navigation at St. Clair Flats, appointed delegates to attend a convention at Buffalo, in the State of New-York, to take into consideration the subject of this improvement, and to raise the necessary funds for carrying it into effect, to such extent, at least, as would relieve them from the most pressing restraints then existing against their navigation and commercial activity. Application was made by the committee for the port of Chicago for authority to use the United States steam-power dredging-machine, under the direction and supervision of this office, in aid of the undertaking.

This led to the proceedings which are detailed by the accompanying correspondence, to which I beg leave to refer. It will there be seen that the first step to be taken, preparatory to commencing the dredging, was to repair the engine of this machine, which had suffered somewhat from its having been sunk under water, as stated in my reports, Nos. 55 and 73, to the Bureau, the first made on the 25th of November, 1854, and the other on the 29th of April, 1855. These repairs were made at the expense of the committee appointed by the delegates to act for them, and the dredging of the middle channel of the South Pass—or that which had been adopted by the War Department, under the recommendation of the Board of Engineers and Topographical Bureau, as the one to be improved—was commenced the latter part of July, 1855. The work was conducted under the immediate supervision of Frank Williams, Esq., civil engineer, of Buffalo, who had been selected by the committee of the delegates to make the examinations of the nature of the work, and the estimates for them. He acted under the general direction of this office.

The dredging was confined to the cutting of the channel, 60 feet wide, with the design of making it wider on completing the first cut, from 12 feet depth in the lake to the same depth in St. Clair river. The depth of cutting was set at 13 feet, in order to allow something for a slight filling up from the wash of the lake waves, should such take place. The dredging was much interrupted by the unusually stormy nature of the season, which has so often been adverted to in preceding parts of this Report, when treating of the operations at other harbors. From this cause no work of any consequence was done after the termination of the first week of October, although the dredging machine remained in position for work until the 28th day of that month. The result was, that 19,589 cubic yards of soil were excavated and removed from the proposed channel-way. Although the extent of the improvement thus produced was not so great as

had been anticipated before the work was begun, yet even this effect was of an appreciable benefit to commerce, because it gave a narrow channel, carrying nearly 10 feet through it, and over the Flats, from deeper water in the lake to deeper in St. Clair river. Should it be found, on the opening of spring, not to have been injured by the wash of the lake waves, since the dredging was discontinued, it will be quite practicable, during the season of 1856, to give a narrow channel, 12 feet deep, clear over these "flats," provided the necessary funds are granted by an early appropriation for that object. Such an effect would be hailed as an important era to the commerce of the great lakes.

The nature of the soil to be removed, has proved to be more tenacious and more difficult than has heretofore been estimated. Instead of being light sand throughout, to a depth of twelve feet, Mr. Williams reports it "to be of two kinds, viz: on the surface, and to a depth of two to three feet we find (he says) a clear, coarse sand; below this, there is a deposit of sand and clay, very firm, so that it requires the whole working force of the engine to drive the bucket into it."*

From this experiment I am compelled to increase the estimate for the necessary dredging, in continuation of this improvement, from twelve and a half cents per cubic yard to double that rate.

Mr. Williams informed me that the dredging already done, cost at the rate of thirty cents per cubic yard.

The expense of the preliminary preparations, and the stormy nature of the season often interrupting the work, probably enhanced the cost somewhat beyond what it would be in future. I therefore put it in the accompanying estimate, marked N 35, at the rate of twenty-five (25) cents per cubic yard. The number of cubic yards, yet to be excavated, is 110,133.

This estimate calls for an appropriation for excavating a channel 300 feet wide and 12 feet deep through the middle approach to the South Pass, including the necessary appliances and the requisite repairs of the machine before commencing the work, of $46,159 07; that is to say, forty-six thousand, one hundred and fifty-nine dollars and seven cents.

The bureau is aware that there is no balance existing applicable to this work, or to contingent expenses relating to it. The above estimate is confined to the last approved plan, (see Docs. N 9 and N 10 hereto attached,) which is limited to drudging only, as the first work to be executed.

I must, however, remark, that I think the opinion of Colonel Abert,

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* The reports, statements in detail, maps, and correspondence, alluded to in [illegible] be found in the original report of Col. Graham, but are necessarily omitted [illegible]tion for want of space.

chief topographical engineer, expressed in his letter to the War Department of September 30, 1854, in regard to this improvement, is well founded, and ought to prevail, namely: that it will be necessary to protect the artificial or dredged channel-way by appropriate defensive works, in order to prevent its being filled by deposites of sand that will otherwise be carried into it by the action of the lake waves in rough weather. The report of the board of engineers, as I understand it, does not positively reject all protection of the artificial channel-way, but it rather proposes, as a measure of proper economy, to defer it until it shall be shown by experience to be requisite.

Viewing this point as the most important to be investigated in the earliest stage of the improvement, I gave to it all the attention that was in my power to bestow in November last.

While we must admit the justice of the view taken by the board, that it would savor of extravagance to erect these protecting works, provided they can be dispensed with, yet, on the other hand, it should be borne in mind that to open the proposed channel-way will of itself be a costly operation, and unless we guard it as we progress, we may lose its benefits to commerce entirely, together with the money it will have cost. I would therefore respectfully suggest that this point should be regarded as the preliminary first of all to be settled.

On the 13th November ultimo, aided by Captain J. N. Macomb, of the corps of topographical engineers, who very kindly took part in the operation, and furnished the boats and crew belonging to his equipment for the survey of the lakes, I made a close examination and survey of the state of the channel which had been cut out by dredging, between the last of July and the last of October previous. The depth to which it was originally cut, as reported by Mr. Williams, was thirteen (13) feet.

The result of the soundings taken by Captain Macomb and myself on the 13th of November, is shown on the accompanying map marked G No. 35. It will there be seen that the depth of a portion of the dredged channel had diminished as much as one and a half to two feet, and that the average diminution throughout was one foot within an average period of thirty-seven days, deducting the portion of October in which no dredging was done.

This diminution was, no doubt, caused by the action of the lake waves on the sandy bottom during the strong gales of wind which prevailed to so great a degree throughout the past summer and autumn. The result indicated by the survey is sufficient, I think, to show the necessity of protecting the artificial channel-way by works of a permanent character, capable of resisting, for an indefinite period, the action of the lake sea. Although this action is not so forcible as upon the great lakes, yet it is one

of almost perpetual duration. The sea has here a sweep of eighteen miles throughout four points of the compass, namely: from southeast to south, and of about sixteen miles throughout four points more, namely: from south to southwest. It is true the protecting works will be in shoal water, and close piling of oak timber one foot square, driven at least twelve feet into the soil at the bottom, might resist the force of the lake sea in ordinary seasons, and the drifting ice in winter for two or three years; yet there would be but little dependence to be placed upon a structure of this sort for a longer period. The channel, being once opened by dredging, should not be subjected to the vicissitude of being closed or interrupted by breaks in its defences. The immense commerce and navigation looking to a safe outlet here, should not be exposed to the probable chances of such disasters.

After having given every attention in my power to the subject, I have respectfully to represent that I do not think the artificial channel, when opened by dredging, can be made secure without the protection of two parallel piers constructed, one on either side of it, in the usual way. I therefore recommend this as the character of the improvement to be adopted. These piers would have a total length of 7,880 feet—that is to say, the pier on the northwest side (see the line A E on map G No 35) would be 3,880 feet long, and the pier on the opposite or southeast side would be 4,000 feet long. It is recommended that the cribs to form this pier-work should be each twenty feet wide, and seventeen feet high from bottom to the flooring at top, thus making the flooring five feet above the water surface, and that they be constructed in conformity with the drawings given on the accompanying sheet marked G No. 19, except in regard to the bolting, which should be of round wrought iron one and a half inch in diameter and arranged as is shown in sheet G No. 21.

The cut-out channel thus protected, would tend to prolong the current from St. Clair river with sufficient velocity to aid greatly in keeping it open.

If it were practicable to perfect the defence of this channel within a reasonable time by the pier-work alone, it would be the more economical plan to do so, and to dispense with close piling altogether. But, considering the amount of work necessary to be accomplished in building the piers, it would occupy at least five-and-a-half years,* with all the activity that could be used during the working seasons.

The immense amount of commerce before alluded to, and which is shown by the accompanying statistics to be dependent upon this channel for its

* This would be at the rate of 44 to 45 cribs finished and sunk in position each working season, which is a very large allowance.

prosperity, ought not to be subjected to so long a delay in securing its practical benefits.

The States of New-York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, and Wisconsin, and the territory of Minnesota, have their shores washed by the great inland seas, whose intercommunication, by ship navigation, is much interrupted by the want of a safe and sure channel over these flats.

The States of New-York, Pennsylvania, Ohio, and a portion of Michigan, on the one side, are crippled in their important commercial relations with the remaining portion of the State of Michigan, and with the States of Indiana, Illinois, and Wisconsin, and the territory of Minnesota, on the other side, by this intervening obstacle. Something would seem, then, under the purview of the Constitution, to be necessary to be done, in order to regulate the commerce between these States. Viewed in this light, the subject becomes one of great public concern.

The value of the articles of commerce and navigation which passed over these flats during the two hundred and thirty days of open navigation, in the year 1855, say between the middle of April and the 1st of December, will be presently shown to have amounted to the immense sum of $259,-721,455 50; that is to say, two hundred and fifty-nine millions seven hundred and twenty-one thousand four hundred and fifty-five dollars and fifty cents. Or, per day, during the navigable season, $1,129,223 72. The improvement, then, when undertaken, should be executed with a degree of permanency and celerity combined, commensurate with its importance and the magnitude of the interests involved.

To accomplish these ends, I would respectfully recommend that the dredging be commenced without delay, and be pushed forward with all possible energy; that close piling be commenced at the same time and pushed forward on the line B F, (see map G No. 35,) so as to afford a temporary protection to that channel as fast as the latter shall progress. In this way a narrow channel of 12 feet in depth, capable of letting the largest class of vessels through, would be opened the first season, together with a protection on the southeast or windward* side, that would prove efficient for at least two and a half or three years.

At the same time, the northwest or leward pier should be commenced and extended on the line A E, (map G No. 35) or perhaps on a line parallel with it and 100 feet more towards the northwest.

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* It is not meant by this expression, that southeast winds are more prevalent, or that they blow with more force than northeast or northerly winds, but that the effect of southeast winds will be greater upon the work because they have a greater sweep over the lake, while those from the northeast and north are sheltered by the land.

To complete this pier, would occupy 2 3-4 years. At the end of this period, the dredging will have attained a width of 300 feet, with a uniform depth of twelve feet, which is allowing forty thousand cubic yards, as the quantity of this tenacious mixture of sand and stiff soil, that could be excavated in a single season by the use of the single dredging machine now belonging to this work.

Immediately on the completion of the northwest pier, the opposite or southeast pier should be commenced on its appropriate line; for it will then have been decided whether the channel should be limited to a width of 300 feet, or be wider. If 300 feet be fixed on as the limit, the southeast pier will occupy the line of the piling B F, (map G, No. 35.)

If a greater width shall be decided on, that pier will be placed so much further to the southeast, and parallel with that line. The piling will, in the latter event, be then removed by either drawing the piles, or cutting them off with a proper machine, even with the bottom of the channel-way.

If this plan were carried out, the following result might be relied on, namely:

1. A channel-way 100 feet wide (considering the dredging already done) and 12 feet deep, capable of letting through the largest class of vessels, together with the close piling on the windward side, and about forty-four cribs, say 1,408 feet in length of the pier on the northwest side, would be accomplished the first season.

2. At the end of the second season, 44 additional cribs would be attached to the northwest pier, making its length 2,816 feet, and the 12 feet channel would be widened to 200 feet.

3. During the third season the northwest pier would be finished by adding 33 cribs, (29 of which would be each 32 feet long, and the remaining 4 would be each 34 feet long,) and the 12 feet channel would be increased to a width of 300 feet. Besides which, 11 cribs would be built and placed on the line of the southeast pier, giving it a length of 352 feet.

4. During the fourth season, 44 cribs would be added to the southeast pier, making it 1,760 feet long, and the 12 feet channel would be widened to 400 feet, if required, by the conditions of the approved plan.

5. At the end of the fifth season, the southeast pier would, by the addition of 45 cribs, have a length of 3,200 feet, and the 12 feet channel would, if required, have a width of 500 feet.

6. By the middle of the sixth season, the southeast pier would be finished to its required length of 4,000 feet, and at the end of that season, the full width of 600 feet of channel-way would be accomplished, having a uniform depth of 12 feet.

The only difference in cost between a width of 300 and 600 feet for the channel-way would be $27,533 25, arising from the double quantity of dredging.—(See the concluding remarks in estimate N 35.)

I would respectfully suggest that more exact information than we now possess should be obtained respecting the probable ratio of increase of navigation in future years, and the actual velocity of the current ejected from the mouth of St. Clair river, before deciding upon this question of width. It can be obtained on the opening of the ensuing season of navigation early enough not to delay in the least the commencement of the work on either plan. There is no doubt that a width of 300 feet is quite sufficient for the commerce of this day; but the vast increase of trade within the last five years, indicated by accompanying statistics, combined with the fact that not one-fifth of the agricultural resources of the country which gives birth to this trade are yet developed, admonishes us to study this question of statistics and the hydraulic force of the river before we undertake to reject the greater width of 600 feet. It is very important, if consistent with these elements, that an artificial channel-way should be secured that will admit the passage of vessels with safety at night; otherwise, the detention to active commerce passing here will be seriously felt. The necessary beacons to aid in this night navigation, have been well digested and presented by the late Captain Canfield, of the corps, and may be considered as well settled.*

I imagine an important question to arise in the minds of those interested in this improvement upon a plan as economical, as to cost, as may be consistent with efficiency. It is as follows: Why will not the close piling, with oak timber one foot square, be sufficient to protect permanently the sides of the artificial channel-way, and thus save the expense of the pier-work?

The importance of this question has been constantly before us in our examinations of the locality and while studying the nature of the improvement.

We have endeavored to digest it well in our own mind, and we are satisfied that the close piling would be destroyed, or so much injured in the course of three or four years by the action of the drifting ice in winter, that the channel-way would be liable to frequent obstructions altogether inadmissable in so important a line of commerce; the expense of dredging would also have to be frequently repeated.

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* See Captain Canfield's report to Colonel Abert, chief topographical engineers, of September 1, 1853, and the map and drawings accompanying it, published with the documents sent with the President's message to the 1st session of the 33d Congress, December 7, 1853, parts 3d and 4th.

COST OF THE WORK.

Estimates, in detail, of the cost of the work, are herewith presented, as follows:

I.—For a channel-way 300 feet wide, and 12 feet deep, and 8,940 feet long:

1. Dredging, as per estimate, marked N 35	$ 46,159 07
2. For close-piling, to protect the south-east side of the dredged channel-way, while the building of the piers is progressing, as per estimate marked N 36 B	64,469 98
3. For two parallel piers, as a permanent protection to the channel way, the one 8,880 feet, and the other 4,000 feet long, estimate N 37	391,829 43
Amount required for a channel-way 300 feet wide	502,458 43

II.—For a channel-way 600 feet wide, and in all other respects like the above:

1. Dredging as per the remark in the closing part of Estimate N 35	$ 76,692 32
2. Close-piling on the south-east side of the channel-way, as before	64,469 93
3. For the two piers, as before	391,829 43
Amount required for a channel-way 600 feet wide	532,991 68

That is to say, five hundred and thirty-two thousand nine hundred and ninety-one dollars and sixty-eight cents.

I recommend that this last mentioned sum be asked for in behalf of this important work, and I will proceed to submit my reasons.

They are based on,

1. *The annual amount of commerce and navigation requiring a free passage over St. Clair flats.*

When the subject of this improvement was committed to my attention, all the elements involved in the proper solution of the problem, and estimates of its cost, had been well considered and brought into the discussion except one, and that a very important one, namely: The annual amount of commerce and navigation requiring aid by the improvement. I had sought information of many practical men on this point, but got only vague and unsatisfactory estimates, founded on inadequate data, varying from twenty to fifty millions of dollars.

It appeared important that the matter should be carefully investigated, especially as it was one involving the interests, both agricultural and commercial, of so many States of the Union. Besides those States named, Iowa, and a part of Missouri are interested in it, because the farmers

these States send annually a considerable amount of grain over this route to the eastern Atlantic markets.*

I therefore determined to send an assistant to the principal lake ports to obtain from the custom-house, warehouse, and mercantile books, the actual statistics of the commerce and navigation of these ports respectively, which passed over St. Clair flats during the season of navigation in the year 1855. That season may be considered as having opened on the 10th of April, and as having closed on the 6th of December, 1855, making its duration 230 days.

The result of these investigations will be found in the accompanying statements marked from N 38 to N 52, inclusive. They embrace the ports of Buffalo, Oswego, and Ogdensburg, in the State of New-York; Erie, in the State of Pennsylvania; Cleveland and Toledo, in the State of Ohio; Detroit, in the State of Michigan; Chicago, in the State of Illinois; and Milwaukie, in the State of Wisconsin. The items appertaining to the other ports on Lake Michigan are absorbed in the statements under the above mentioned heads, and care has been taken not to count the same items twice, under the varying heads of "imports" and "exports," or "receipts" and "shipments." For instance, having obtained at Chicago and Milwaukie the amount of the trade, both by imports and exports, with the port of Buffalo, on going to Buffalo to obtain the statistics there, the articles which came from or went to Chicago and Milwaukie were left out of the count under the Buffalo head, and so on, throughout; what was once counted as imports or exports from one port to another, was not again counted under the reverse title, on going to that other port.

This investigation of the amount of commerce and navigation over St. Clair flats for the year 1855 has involved of itself a close examination and analysis of 85,240 pages of large folio counting-house manuscript books, besides 21,834 ship-masters' manifests. Not a quantity has been introduced into our aggregates that has not been obtained from actual data. My assistant in this great labor was Captain Edward Kelly, of Chicago, who performed his duties in a faithful and highly satisfactory manner. All his returns were critically reviewed, under my immediate supervision, in this office, and approved.

The following results are shown:

* Nebraska and a large portion of Kansas will also be much interested in this improvement when their agricultural resources shall become developed. Most of their grain will go over this route, to the eastern Atlantic markets.

1. The value of enumerated articles of merchandise received at the port of Chicago, Illinois, which passed over St. Clair flats, in the year 1855 was, as per accompanying statement, marked N 38 .... $91,771,717 98
2. Value of enumerated articles of merchandise shipped from the port of Chicago, Illinois, which passed over St. Clair flats, in the year 1855, (statement N. 39.) 21,928,530 91
3. Value of enumerated articles of merchandise received at the port of Milwaukie, Wisconsin, which passed over St. Clair flats in the year 1855, and not included in any preceding enumeration, (as per statement marked N 40) 14,065,507 08
4. Value of enumerated articles of merchandise shipped from the port of Milwaukie, Wisconsin, which passed over St. Clair flats, in the year 1855, not included in any preceding enumeration, (see statement N 41) 8 738,936 75
5. Value of enumerated articles of merchandise received at the port of detroit, Michigan, which passed over St. Clair flats in the year 1855, not included in any of the above enumerations, (see statement marked N 42) 676,764 50
6. Value of enumerated articles of merchandise shipped from Detroit, Michigan, which passed over St. Clair flats in 1855, not included in any preceding enumeration, (see statement marked N. 43) 21,005,626 00
7. Value of enumerated articles received at Toledo, Ohio, which passed over St. Clair flats in 1855, not before enumerated, (see statement marked N 44*) 145 325 00
8. Value of enumerated articles received at the port of Cleveland, Ohio, which passed over St. Clair flats, in 1855, not enumerated before, (see statement N 45) 2 354,683 50
9. Value of enumerated articles shipped from Cleveland, Ohio, which passed over St. Clair flats in 1855, not before enumerated, (see statement marked N 46 .... †9,247,812 15
10. Value of coal, (32,391 tons), shipped from the port of Erie, Pennsylvania, which passed over St. Clair flats, in 1855, not before enumerated, (see statement marked N 47) 161,955 00
11. Value of enumerated articles received at the port of Buffalo, State of New-York, which passed over St. Clair flats, in 1855, not before enumerated, (see statement N. 48.) 2,867,407 10

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* The books at Toledo showed no shipments from that port, over St. Clair flats, that were not included in receipts stated at other enumerated ports.

† It was impossible, without devoting a very long time to examine various records at Cleveland, to get an accurate statement of all the shipments over St. Clair flats from that port in 1855. The list contained in statement N 46 falls far short of the whole. It is believed that the value of articles shipped from Cleveland, Ohio, that went over St. Clair flats in the year 1855 was full $15,000,000. We, however, limit our valuation, introduc our aggregate, to what was actually obtained from authentic records, although we k were not complete.

12. Value of merchandise shipped from the port of Buffalo, New-York, which passed over St. Clair flats, in 1855, not before enumerated, (see statement N 49)........................	$76,560,000 00
13. Value of enumerated articles of merchandise received at the port of Oswego, New-York, which passed over St. Clair flats in 1855, not before enumerated, (see statement N 50).......	19,200 00
14. Value of lumber (497 M feet,) received at the port of Ogdensburg, New-York, which passed over St. Clair flats, in 1855, not before enumerated, (see statement N 51).............	9,940 00
15. Value of merchandise shipped from the port of Ogdensburg, New-York, which passed over St. Clair flats in 1855, not before enumerated, (see statement N 52)...................	1,614,800 00
Total value of merchandise and agricultural produce known to have passed over St. Clair flats during the 280 days of navigation in 1855..	251,167,705 97
Or, per day, during the season of navigation in 1855..............	1,092,083 50

It is shown by the foregoing facts that the cost of the improvement, according to the plan above recommended, and for a channel-way full 600 feet wide, will be less than the average value of merchandise and agricultural produce which passed over St. Clair flats during each half day of the navigable season of the year 1855.

It is making no more than a reasonable allowance for the effect of the obstruction to commerce now existing at St. Clair flats, to say that, had that obstruction not existed, the value of the merchandise and produce that would have passed, in 1855, would have been full fifty per cent. more than it actually was, or that it would have amounted, during the navigable season of 1855, to $376,751,558 95. This would have been an average value per day of $1,638,050 25, or per day more than three times the estimated cost of the work, to be done in a permanent manner, and with a channel-way 600 feet wide, and full 12 feet deep.

It should be borne in mind that such a channel would admit as free and safe a navigation at night as during the day. In the present state of the flats, no navigator ever thinks of attempting to pass them, except by daylight. This cause of detention, added to that of vessels grounding, during their attempts at a day-passage, and remaining aground, often for several days, before they can be got afloat and tugged over, actually shortens the navigable season to quite one-half of what it will be when the improvement shall be completed, in the manner that shall best obviate all the difficulties.

In drawing our comparisons between the relative cost and the benefits to be derived from this improvement, if accomplished in a permanent manner, we have; so far, confined our estimates of the benefits to an exhibit of the amount and value of the merchandise and agricultural produce which

passed over these flats in the year 1855; or, in other words, to the amount of capital invested in these commodities. But there is still another species of capital, of great value, which is equally involved and equally interested in this improvement. It appertains, also, to all the States already enumerated as bordering on these great lakes. We allude to the tonnage, or shipping, which is constantly employed in carrying those commercial and agricultural commodities over St. Clair flats. The capital invested in this kind of property is as much entitled to consideration and protection as the other two.

We therefore present an analysis of it, as far as we have been enabled to obtain it from actual data. We are, however, aware that this presentation falls short of its full amount, because some of the lesser ports on the lakes, engaged in shipping over the flats, could not, for want of time, be visited, in order to obtain their commercial statistics.

The amount and value of the tonnage which was thus employed during the navigable season of the year 1855, is shown, as far as could with certainty be ascertained, by the accompanying statements, marked from N 53 to N 70.

Statement N 53 is an exhibit of the tonnage of each of the districts of Chicago, Milwaukie, Detroit, Cleveland, Buffalo, Oswego, and Ogdensburg, N. Y., employed in trading over St. Clair flats, and showing the valuation or actual cost of building and equipping the said vessels.

The aggregate tonnage of these vessels amounts to (N 53)...	195,875 tons.
The first cost of these vessels and their equipment amounts to......$	8,553,750 00
This sum, added to the value of merchandise and agricultural produce before given, viz.,......	251,167,705 50
Shows the amount of capital invested in commerce and navigation, which passed over St. Clair flats in the year 1855, to have been......	$259,721,455 00

Statement N 54 shows that the amount which accrued on freights of merchandise and agricultural produce, shipped over St. Clair flats in American vessels, in the year 1855, was $13,761,840 00.

And in foreign vessels trading with American ports, $551,256 00.

These results are derived by allowing six dollars per *register* ton as the price of freights upon the amounts of tonnage that passed over and from the ports mentioned in the districts of Chicago, D troit, Cleveland, Buffalo, Oswego and Ogdensburg, as show panying statements, marked from N 55 to N 70, inclu are, of course, the gross amounts of the receipts accruir

The nett proceeds would be the difference between these sums and the expenses of navigation, such as the hire of crews, insurance on the vessels, repairs, tugging off St. Clair flats when aground, losses from detention while thus aground, pilotage, harbor fees, &c.

Among these enumerated expenses, that which arises from the detention, damage, and towage by steam-tugs, caused by the obstruction to navigation at the flats, is the one regarded as the most onerous by the navigators, the merchants, and the farmers of the nine States and one territory before mentioned.* They all have to bear a portion of the additional charges which arise from this cause. The farmer has, however, the most oppressive part of the burden to bear, because the navigator clears himself in a great measure by his increased charges for freight, and the merchant by increasing his prices at retail, on account of the losses by the detention and risk growing out of this obstruction to navigation. But the farmer is compelled to be governed by current prices for his grain, and the diminution of price allowed him by the shipper, on account of the contingencies due to the want of free navigation over the flats, is a direct tax on the fruits of the farmer's industry.

The increase on the rates of freights, owing to the obstructions, as it now exists, may be estimated at full 15 per cent., or annually to the sum of $2,064,276. Full two-thirds of this amount falls on the farmers.† They may therefore be said to pay an annual tax on their produce and necessary articles of consumption, arising from this obstruction, of $1,376,184, which is more than two and a half times the estimated cost of the work, upon the most extended plan proposed.

We have endeavored, in the foregoing remarks, to show the great importance of this improvement to the agricultural, commercial, and shipping interests of a very considerable portion of the people of the United States. The estimate which we present of its cost, upon a safe and durable plan, compared with the amount and value of the commerce which daily demands an easy passage over this great thoroughfare of trade, shows how small the sum required for its accomplishment is, in comparison with the interests involved, and the benefits to be derived from it when completed.

But there is still another and a fair more important feature which attaches to this improvement, giving it a peculiar claim to attention. It is—

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* The States of New-York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, Iowa and Missouri, and the territory of Minnesota.

† It will be remembered that the farmer is burdened in a two-fold capacity, viz.: first as a producer, and second, as a consumer.

II. *The importance of improving the channel over St. Clair flats, viewed as a necessary element in the military defence of the national frontier.*

War is a calamity which every wise statesman and every good citizen will, by all rightful means, endeavor to eschew. But it is an evil not always to be avoided; and when it comes, it is not unfrequently when least expected. It certainly ought not to be when a nation is unprepared for it. The history of all ages shows that preparation is one of the surest means of prevention, as well as of success, if it come.

This peaceful remedy is peculiarly applicable to our extended northern frontier, stretching over a length of twelve hundred miles of ship navigation through the great lakes. Since the opening of the Saut St. Marie canal, the only obstacle to the co-operation of armed fleets, which, in time of war, would be placed upon Lake Superior, Michigan, and Huron, with that which would be on Lake Erie, is at St. Clair flats.

That obstacle removed, and a depth of channel of twelve feet* obtained there, war-steamers of the largest class which would probably be placed on these lakes would have a free navigation from Buffalo, at the foot of Lake Erie, to Fon du Lac of Lake Superior.

The locks of the Saut St. Marie canal now admit the passage of vessels of full fifteen feet draught at the highest stage of water, and twelve feet at the lowest stage.

It would be very important that these naval fleets should have the power of concentration, either wholly or in part, at certain important points now rendered impracticable by these intervening flats.

It would, no doubt, often be important as a measure of naval tactics alone. It would as often again, be equally necessary in co-operation with our land forces. It might even become necessary, and no doubt often would, under the various vicissitudes attendant on war, to depend on the navy to transport our land forces rapidly from one point to another on different sides of the flats. Any enemy, through the secret emissaries and spies who are always used in time of war, designing a rapid movement in order to concentrate and operate with force upon a given point against us, would find but little difficulty in favoring his scheme by causing a few rods of our railroads to be torn up at several different points, and thus prevent a counter movement, on our part, by land. Our only alternative, then, would be to move by water through the aid of our armed ships. The movements of this sort would not unfrequently be over the St. Clair flats, if they afforded a sufficient depth of channel.

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* The depth may easily be increased to 16, or even 18 feet, by dredging, should war steamers of that draught of water be required on the great lakes.

In default of such a channel, the delay and exposure to the attack of a land force, incident to a landing, the making of a short march, and a re-embarcation, would have to be encountered. Such a vicissitude would sometimes be sufficient to cause the defeat of the party which otherwise would be victorious. It might, indeed, be the means of transferring to the enemy the mastery on an important line of operations during a whole campaign, or during the war.

When a work like this subserves the double purpose of military defence in times of war, and of promoting the interests of commerce between several of the States of the Union in time of peace, it would seem to have an increased claim on the attention of the general government. If any work of improvement can be considered national in its character, the improvement of St. Clair flats in the manner proposed, may, it is submitted, justly claim to be placed in that category.

Respectfully submitted.

J. D. GRAHAM,

Major Topographical Engineers, Brevet Lieutenant Colonel,
Superinttnding Engineer, &c. &c.

THE QUEEN OF THE PACIFIC.—After considerable delay, this great steamer has been launched from the yard of S. G. Bogert, New-York. She is of 3,000 tons burden, designed for the Pacific coast, and will be the largest steamer ever in those waters. Her dimensions are—Length on deck, 325 feet; length of keel, 315 feet; breadth of beam, 43 feet; depth of hold from the spar deck, 30 feet. She is diagonally braced with heavy iron straps, each of which is fastened at the head to a brace, which surrounds the ship at the height of the main deck, under the clamp. Her floors and futtock timbers are of white oak, top timbers of tamarack; she is planked throughout with white oak, and ceiled with yellow pine, which tapers gradually from 12 inches at the bilge to 6 inches at the main deck clamps. She will be propelled by one single beam engine, with a ninety-inch cylinder, and 12 foot stroke, now building at the Morgan Iron Works. Her guards will be constructed in such a manner as to afford facilities for promenading seldom enjoyed in sea-going vessels, and good ventilation is secured by means of large ports, and high airy between-decks.

THE NEW STEAM REVENUE CUTTER.

At the last session of Congress $150,000 were appropriated for the construction of a Steam Revenue Cutter, for service off the coast of the port of New-York. It is designed that this vessel shall answer the two-fold purpose of of a revenue-cutter and a relief-vessel to assist ships in distress in periods of storm and peril from inclement weather, in approaching the coast. For the first time in the history of government ship-building in this country, the *genius*, and not the capital and political influence of ship-builders has been called in requisition to supply a vessel adapted to a particular service. Mr. Guthrie, the then Secretary of the Treasury, advertised for proposals for the construction of a steam revenue-cutter of 600 tons, to carry eight guns on the main-deck, and two pivot-guns on the bow and stern. These proposals were to be confined to *ship-builders*, and to be for the vessel, propelling-power, and equipments complete, and ready for service. The armament was not included, and the bids were to be made for "the model and specifications calculated to secure the *strongest*, *fastest*, and *best* vessel, the model, specification, and price to be the subject of agreement with the Department," after they had been selected from the list offered. Here was the only true basis put forth whereon the Department could have a right to expect a superior vessel. The ship-building genius of the country had, in this advertisement, a warrant for protection from the sinuous demonstrations of demagogues and wire-pulling politicians, and from the corrupting influences of avaricious capitalists, who might otherwise be bound to obtain the contract for a low price, but derive a profit from inferior workmanship.

The spirit of honesty and progress was thus invited to show hands to the Department, and offer their gifts for adoption, which might not be proposed nor given by a money-making tradesman doing work for any price. Hitherto the government has been very generally cheated under the contract system—and especially the *lowest bidder* system. David Crockett's maxim cannot be improved upon—"Be sure you are right, and then go ahead."

Notwithstanding the terms proposed for the preference of bidders, viz.: *merit in model and specifications*, there were, amongst the ship-builders of New-York, those who resorted to all manner of intriguing and wire-pulling, politically and commercially, to supply that favor with the Department which they must have felt would be wanting in their models and specifications. Such a course should find decided disfavor; it remains to be seen how the scale will preponderate—whether the independent genius of country shall be mocked or dealt with fairly by the government. We

strong faith in the Hon. Secretary of the Treasury, but very little confidence in the judgment of some of his advisers.

On Monday, the 13th of April, the time for putting in proposals at Washington expired. The models were received and opened, and a commission, consisting of Mr. Lenthal, Chief Naval Constructor, Mr. Martin, Chief Naval Engineer, and Mr. Copeland, Consulting Engineer, was appointed to examine the models and specifications, and report the *best* to the Department. Mr. Lenthal and Mr. Martin, being discreet and modest gentlemen, both declined on tuesday. On the same day, at noon, the last model was received and opened. The bidders were then invited to the Assistant Secretary's office, and the bids were opened in their presence. The first was from

		Price.
Vaughan & Lynn	Philadelphia	$ 110,000
Edward Lupton	New-York	140,000
Page & Allyn	Portsmouth, Va	150,000
James R. Steers	New-York	138,000
Abraham C. Bell	New-York	129,000
Theo. Harrington (not a ship-builder)		140,000
William H. Webb	New-York	no price.
John W. Griffiths	New-York	no definite price.
A. Patterson	Brooklyn	$ 84,940
Jacob A. Westervelt	New-York	122,500
Thomas Colyer	New-York	131,725
Thomas Stack	Brooklyn	136,750
Thomas Erskine	New-York	130,000
J. T. Fardy	Baltimore	124,900

Mr. Erskine offered two models, and Mr. Griffiths presented three, with an equal number of specifications for engines and propelling machinery. The other builders offered but one model. We shall postpone an analysis of the models offered to the Department, until the next number.

After Mr. Lenthal declined, Mr. Samuel M. Pook, Constructor of the Washington Navy-Yard, was appointed in his place. Mr. Hunt, an engineer in the navy, was appointed in the place of Mr. Martin. Mr. Griffiths, conceiving the model, construction, and equipment of vessels, of more importance than the engines, and the Department having made it of less, by appointing two engineers and but one constructor, proposed to Messrs. Webb and Westervelt to ask for the addition of one more constructor to the commission, and, in case of a disagreement, to call in Mr. Lenthal to decide. This was listened to by the Department, and a due consideration promised.

THE STEAM FRIGATE NIAGARA.

The new steam frigate *Niagara* has been put in commission, with a working force of 490 men, for the peaceful task of laying the great submarine cable. She sits upon the water in her vast proportions as a model of neatness and beauty. Being fitted with "auxiliary" steam power, she will rely for speed mainly upon her sailing qualities under canvass. Her speed has not yet been tested by trial, owing to an accident in breaking a cylinder-head while steaming down the harbor. Captain Hudson, who is a noble specimen of an American officer, is to command her. In his cabin is a most interesting likeness of the great marine architect who designed and constructed the *Niagara*, George Steers, painted in oil, life size, and framed in carved rosewood. This was painted for and presented by the workmen employed by Mr. Steers on the frigate, and will always have honorable place in the Captain's cabin. Professor Morse and Peter Cooper, Esq., will occupy state-rooms adjacent on the trip laying the cable. Her officers are:

Captain William L. Hudson; Commander Pennock, (on special service;) First Lieutenant, Jos. H. North; Second Lieutenant, J. D. Todd; Third Lieutenant, John Gurst; Fourth Lieutenant, C. Wells; Fifth Lieutenant, William Whiting; Sixth Lieutenant, E. Y. McCauley; Seventh Lieutenant, Beverly Kennon; Purser, Joseph C. Eldredge; Chief Engineer, Wm. E. Everett; Surgeon, J. C. Palmer; P. Assistant Surgeon, Arthur M. Linah; Assistant Surgeon, T. W. M. Washington; Captain Rich, (U. S. Marines); Lieutenant Boyd, (U. S. Marines); First Assistant Engineers, John Faron, Thomas A. Shock; Second Assistant Engineers, Mortimer Kellog, John W. Moore; Third Assistant Engineers, Alexander Greer, Jackson McElwell, George F. Kutz, Theodore R. Ely; Captain's Clerk, John W. Hudson; Purser's Clerk, Edward Willard; Boatswain, Robert Dixon; Carpenter, H. P. Leslie; Gunner, John Webber; Sailmaker, Wm B. Fugitt.

In addition to the above, she will have one boatswain's mate, one gunner's do., one carpenter's do., one yeoman, one master-at-arms, one ship's cook, five quartermasters, two quarter gunners, four captains of the forecastle, six captains of the tops, two captains of the afterguard, seven coxswains, one ship's steward, two officers' do., one surgeon's steward, one sailmaker's mate, two captains of the hold, two officers' cooks, corporals, 100 seamen, 100 ordinary do., and 100 landsmen rines there are four sergeants, three corporals, two mus vates. In the Engineer's department, 46 firemen an employed.

IMPORTANT MEETING OF THE NEW-YORK CHAMBER OF COMMERCE.

The second quarterly meeting of the Chamber of Commerce, for the year 1857, was held in Clinton Hall, Astor-place, Peletiah Perit presiding.

After the minutes of the previous meeting had been read and adopted, Mr. E. D. Morgan was elected member of the Committee of Arbitration.

Mr. Matthew Maury presented the report of the Committee on a Self-regulating Observatory, which suggested the battery as the most eligible site on which to erect it.

The Chairman then read a communication from the Boston Board of Trade, which was to the effect that that body had appointed a committee to proceed to Washington for the purpose of taking measures for protecting American interests in the China trade, now endangered by the war raging between England and China, and suggested to the Chamber of Commerce of this city the propriety of appointing a similar committee, to proceed to Washington, to circumvent the same object. In accordance with a resolution offered by Mr. Low, and adopted by the meeting, the Chairman appointed A. A. Low, J. C. Green, D. Olyphant, R. B. Minturn, and W. F. Cary as that committee.

Mr. E. Morgan then offered the following resolution :

Whereas, The extent of marine losses has been of late generally increased by the inefficiency and insubordination of the crews of ships, and *Whereas*, Public attention on both sides of the Atlantic has been called to alleged cases of revolting cruelty on ship-board, and *Whereas*, It is believed that the deception practiced in the shipping of crews has contributed largely to these evils :

Resolved, That a committee of twelve be appointed to inquire into the alleged facts, and to confer with ship-owners as to the measures which can be adopted to remedy these evils, and to report at a future meeting of the Chamber.

The resolutions were adopted, and the following gentlemen appointed the Committee :—E. E. Morgan, R. B. Minturn, T. Tileston, A. B. Neilson, E. Richardson, J. D. Jones, R. L. Taylor, Henry Grinnell, Francis M. French, A. C. Kingsland, George Briggs, and J. S. Williams.

Mr. Barstow, Chairman of the Special Committe to whom was referred a communication from J. Smith Homans, Editor of the *Banker's Magazine*, presented their report, complimenting the author of that periodical for his valuable suggestion as to the propriety of the Chamber taking measures for presenting, annually, a *resume* of important commercial operations of the United States, and of establishing a reference library, to contain a col-

...ction of commercial statistics, all the commercial newspapers and periodicals of the day, together with the appropriate accompaniments of globes, maps, &c., and suggesting that the Chamber carry these propositions into effect. The Committee furthermore recommended that a lot of ground be purchased in a suitable locality, for a site, upon which to erect a building for the accommodation of the Chamber of Commerce, to serve as a place to hold its meetings, and repository for its archives, and the proposed library, when established.

The report, which was not a final one, was accepted, and the Chairman suggested to the meeting the propriety of discussing the subject, and coming to a general understanding upon the matter, until, at a future time, more definite and final action could be taken.

Mr. Prosper W. Wetmore eloquently set forth the importance of the subject under consideration, and the remarkable position in which the Chamber was placed, when, although now in the eighty-ninth year of its existence, it did not possess a room or edifice in which to hold its meetings, or preserve its history. Having done so much, he said, for the commercial prosperity of the community, it was but just and proper that it should do something for itself, more especially as it represented the commercial wealth of the Empire City.

Mr. Wetmore's remarks were warmly applauded, and other gentlemen spoke in favor of the project. On motion of Mr. Stratton, the Committee were directed to hire the hall in the Merchants' Exchange, at present occupied as a reading-room, or some other room or hall, at a rent not exceeding $1500, for the use of the Chamber, until the proposed ediffice be erected.

The Committee on the Revenue Laws reported progress, and after the nomination of several gentlemen for membership, the meeting adjourned.

SHIPPING REVIEW

FREIGHTS IN APRIL.—The month of March closed without improvement in rates. Only a moderate business doing in any direction. The beginnning of April showed the same signs of dullness. We quote the following state of the market on the 15th of this month.

Engagements to Liverpool; Grain, at 3½d *a* 4½d; Flour, 1s. 4d. *a* 1s. 6d; Cotton, 1-8d. *a* 5-32d.; Rosin, 1s 9d. To London: Rosin, 2s. *a* 2s. 9d.; Tobacco, 2s.; Oil Cake and Rice, 20s. To Glasgow: Quercitron bark, 27s. 6d. To Venice: coffee, ½c.; rosin, $1; logwood, $10 To Antwerp: Mahogany, 25s.; flour, 50c. To Bremen: measurement goods, 20s. *a* 25s.; Rice, 27s. 6d.; compressed cotton, ½c.; tobacco, 25s. To Hambur[illegible] honey, 2½c. per gallon; rosin, 2s. 6d. *a* 2s 9d.: oil, 3[illegible]; cotton, 5-8c.; measurement g[illegible] 22s. 6d. *a* 25s.; pipe staves, $12. Nothing of moment doing to French ports.

The charters include a ship, 700 tons, from St. George, N. B., to Bristol Channel, Deals, at 70s.; two now in Mobile, from Bic to London, 90s.; Ship *Continent*, 1098 tons, hence to Melbourne, about $14,000; Ship *Crystal Palace*, 653 tons, to Sydney, N. S. W., about $10 per ton; Ship *Lotus*, 660 tons, to San Francisco, $10,000; a Danish brig, 250 tons, to Cronstadt, £420; one from Trinidad, Cuba, to Cowes and a market, hhd. sugar, £2 17s. 6d.; a schooner from Jacksonville to Buenos Ayres, lumber, $24, and back to New-York from Rio Grande, dry hides, 3-4c. per lb.; a brig, from Union Island, lumber, to Aspinwall, $16, thence from Jamaica to New-York, $6 per ton; a bark, from Jacksonville to Jamaica, lumber, $10; a brig, 200 tons, from Barbadoes to Portland, or New-York, molasses, $3; one, to Guadaloupe, 800 bbls., at 60c., and lumber, $6, and back from north side Cuba to New-York, sugar, 40c., and molasses, $3; one, 300 tons, to Remedios, and back, 38c. and $3, with privilege of full cargo molasses at $3.50; a brig hence to St. Thomas and Laguayra, 50c. per bbl. to the former, and 80c. to the latter; one to Sagua, hhd. shooks, 25c., and hoops, $8; a schr., 90 tons, to St. Martin and back, with fruit, $800; a schooner, from Jacksonville to New-York, flooring-boards, $9; one, 200 bbls., to Tampa bay, government stores, $1200; one from Crystal River, Flor., and another from Cedar Keys, to New-York, wood, 12½c. per foot; a brig, from Chesapeake to Bath, white oak timber, 11 25; one hence to Savannah, and a schooner to Charleston, hay, 15c.; a schooner to Norfolk, hay, 12½c.

SEAMEN AND WAGES.

Sailors continue very scarce, and great difficulty is experienced in obtaining crews for Liverpool, even at the $35 advance now paid to the landlords, who always receive the sailors' advance wages.

We are glad to see that the merchants of New-York have taken measures to investigate the difficulties experienced in the scarcity of material and character comprising the sailors of the present day; and we trust the labors of those to whom the matter has been referred will result in some creditable action for relief.

SALES OF VESSELS.

A new ship, 1300 tons, built by John Yeaton, Portsmouth, N. H., for $65,000, half cash.
Ship Mary and Martha, at auction, for $49 000. An old whaler.
Ship Alice Ball, on stocks of Toby and Littlefield, Portsmouth, N. H., 1000 tons.
Ship Shooting Star, late of Boston, in China, at $40.000, for opium trade.
Brig Orlando, of Philadelphia, about nine years old, at $1,000, built in Maine.
Ship Edward, of Nantucket, whaler, for $4,000
Ship Messina, 1200 tons, built 1854, by Arnold & Co., Bath, Me., at New-Orleans, for $50.000.
Ship Marcellus, 600 tons, built at Medford, Mass., 1848, at auction, for $21,000.
Brig Yuba, 225 tons, seven years old, sold by U. S. Marshal for $4.500.
Brig Amanda Jane, 277 tons, 2½ years old, sold in Newport, R. I., for $9,500.
One-sixth of bark David Kimball, 449 tons, three years old, built at Rockland, Me., at auction, for $710.
Schooner Stranger, of New-Bedford, 85 tons, for $1,900.
Brig Fiorentine, of Augusta, Me., 257 tons, one year old, sold for $12,000.
Schooner Ingomar, four years old, 267 tons, built at Bath, Me., sold for $6,400 cash.
Bark Aeriel, of Fall river, 225 tons, six years old, sold for $5,100.
Ship Belvidere, (new,) 1220 tons, built by Paul Curtis, sold for $60,000, equal to cash.
Schooner Lane, 168 tons, three years old, built at S. Thomaston, Me., sold for $5,000.

LAUNCHES.

At New-York, by Westervelt Building Co., steamer Queen of the Pacific, April 12, after a number of attempts.
At Medford, Mass, March 25, by J. O. Curtis, ship Bunker Hill, 1,000 tons.
At Baltimore, April 1. by Flannegan & Beacham, an herm. brig, 210 tons, for West India trade.
At Castine, Maine, March 25, by S. & J. H. Noyes, & Co., ship Castine, 1000 tons. General freighter.
At Williamsburg, L. I., by Laurence & Foulks, tow-boat John Styles, 98 feet keel, 28 feet beam, 7 × 6 hold. 170 tons.
At Canton, Baltimore, March 28, by Booze & Bro., a pilot-boat, 66 feet long, 18 feet beam, 7×6 hold.
At Bath, Me., March 25, by E. & A. Sewall, ship Leander, 900 tons.
At Greenpoint, L. I., March 25, by Edward F. Williams, schooner John T. Williams, 118 feet keel, 130 feet deck, 32 feet beam, 9 feet hold.
At Newburyport, Mass., April 8th, ship Sarah Newman, 900 tons, for the Calcutta trade.
At E. Boston, March 26, by Burkett & Fyler, a freighting-ship of 1200 tons.
At E. Boston, Mar. 25, by S. Hall, a ship of 750 tons.
At Noble's Island, N. H., recently, brig Molly Stark, 170 tons, for Cochin China trade.
At Portsmouth, N. H., April 1, ship Alice Ball, 1000 tons.

DISASTERS AT SEA.

STEAMERS.

Gambia, for Africa, in collision with steamer Scotland, both much damaged.
H. B. Beach, (prop.) at Boston, leaky, had grounded on Cohasset Rocks.
Parker Vein, (prop.) returned to Baltimore, machinery injured.
Herald, for Norfolk, put back to Baltimore, broke shaft off Point Lookout.
Westernport, (prop.) for New-York, put into Holmes' Hole to repair machinery.

SHIPS.

British Monarch, Savannah for Newport, abandoned April 8, leaking badly.
South Carolina, for Boston, put into Tarpaulin Cove, lost some spars, sails, &c.
Pennsylvania, New-Orleans for Havana, totally lost on Salt Key Bank.
Continent, Hampton Roads, lost cut-water, sails, some spars, &c.
Arthur, Savannah for Port Glasgow, abandoned, leaky, fourteen of crew lost in a boat.
Hualco, (new,) of Belfast, lost masts, and drifted on Brimstone Reef.
Andrew Jackson, at San Francisco, from New-York, lost head of fore-mast.
West Wind, at San Francisco, from Boston, leaking three feet per hour.
War Hawk, at San Francisco, from New-York, lost jib-boom, &c.
Meteor (Br., put into Key West, leaking, sailed for Liverpool with a steam pump on board.
Sir Harry Smith, St. Johns, N. B., abandoned, lost rudder, and waterlogged.
Golden Racer, totally lost in the river Min, China, early in Jan.
Fly-away, grounded in the river Min, China, early in Jan.
Defence, in collision, March 3, at Gibraltar, much damaged.
Alliance, for Charleston, put into Dartmouth, Eng., very leaky.
Sea, from New-Orleans, wreaked at White Haven, Great Britain.

BARQUES.

Col. Ledyard was seen making for a harbor, with loss of mainmast, &c.
May Queen, at Baltimore, from Rio Janeiro, split sails, lost spars, boat, &c.
Franklin, at Boston, from Trinidad, lost bulwarks, &c.

Edward Everett, at Baltimore, from Boston, lost deckload, spars, &c.
Sylph, at Charleston, from Boston, slit sails, &c.
Ranger, Matanzas for New-York, abandoned in a sinking condition.
Arthur, New-York for Cadiz, abandoned leaky, with loss of rudder, &c.
Catharine Duckwitz, (Bremen.) at New-York, lost deck-cabin, sails, bulwarks, &c., leaking.
American, at New-York, from Cardenas, lost deck-load, stove quarter-deck, &c.
Fleet Eagle, at Boston, from Algoa Bay, lost and split sails, &c.
G. W. Hall, for Boston, put into Holmes' Hole, leaky, lost head-rails, split sails, &c.
Prerogative, (Br., new,) for Savannah, put into Beaufort, N. C., lost some spars, and leaking.
Trinity, Boston for Galveston, got ashore on Pickles Reef, March 14.
Ellen A. Parsons, Palermo for New-Orleans, totally lost at Cape Palios, Mar. 27th.
Sarah B. Hall, at Cardenas, from Boston, lost deck-load.
N. W. Bridge, at Cardenas, from Boston, lost deck-load.

BRIGS.

F. Nelson, for Thomaston, put into Newport, lost sails, &c.
Alfaretta, Havana for Boston, put into Holmes Hole, lost sails, &c.
E. Baldwin, Matanzas for Boston, put into Holmes Hole, lost deck-load.
Edward, from Cardenas, totally lost on Cape Hatteras, April 10th.
Star, (Br.,) from Barbadoes, totally lost at the Western Isles.
Isola, at New-York, from Cardenas, split sails, lost boat, &c.
Marshfield, at New-York, from Cienfuegos, cut away foremast.
Belle Poole, at New-York, from Trinidad, Cuba, leaking 400 strokes.
J. B. Coffin, Cape Haytien for New-York, totally wrecked at Mayaguara.
Reuben Carver, in collision, Feb. 26, and abandoned.
Sylph, for Cienfuegos, put into Rockland, March 23, leaky.
R. C. Dyer, Havana for New-York, put into New Haven in distress.
M. & J. C. Gilmore, for Mobile, put into St. George's, Bermuda, Mar. 15, dismasted.
Chesapeake, at Cardenas, from Boston, lost deck-load.

SCHOONERS.

Traveler, Mobile for Honduras, totally lost on Colorado Reef, Cuba.
Mary Ann, (Br.) at Philadelphia, from Halifax, leaking, had lost sails, &c.
Egret, for Boston, put into Portland, lost deck-load, boats, &c.
Mary Staples, for New-York, put into Charleston, April 8th, lost foremast, part of deck-load, &c.
Mary Isabella, Baltimore for Wilmington, totally lost at New Inlet.
Mary Eddy, at Baltimore, from Savannah, lost deck-load, &c., second mate lost.
Presto, (Br.,) Halifax for Boston, totally lost on Venial Head, Me.
Ocean Bird, at Boston, from Aux Cayes, lost part of deck-load, &c.
J. H. Chadbourne, at Wilmington, N. C., from Boston, damaged in hull and spars, leaking.
Sarah Burton, at Charleston, from Matanzas, lost sails, bulwarks, boats, &c.
Ella Francis, Boston for Langier, put into Norfolk with loss of anchors.
Sarah E. Lewis, Boston for Tangier, put into Norfolk, lost some sails.
Allen H. Brown, at New-York, lost bowsprit &c., in contact with a ferry-boat.
William, at New-York, in distress, leaking, lost some spars, sails, &c.
A. T. Western, at New-York, lost deck-load, main-boom, &c.
Norman, at New-York, from Bucksville, S. C., lost sails, boat, deck-load, &c.
Caroline Knight, at New-York, from Laguayra, split sails.
Baltic, at Norfolk, lost jibboom, in collision with schooner Leroy.
Bloomer, got ashore, March 9, at Wellefleet.
Emily, Charleston, N. S., for Beaufort, N. C., dismasted and abandoned, two lives lost.
Harriet Hallock, at New-York, from Para, lost entire set of sails, compass, &c.
S. & B. Small, at New-York, in distress, lost deck-cabin, leaking, had decks swept, &c.
Marcia, New-York for Boston, wrecked on Watch Hill Reef, a total loss.
William Carroll, for Norfolk, was spoken, lost mainmast, bowsprit, &c.
Jarvis Lyon, ran into bark Mary B n'ley, sank in 15 minutes.
Sarah Ann, at Charleston, from Philadelphia, lost anchors, boat, &c.

NOTICES TO MARINERS.

AMENDMENT OF THE PILOT LAWS.—The attention of shipmasters and others interested is called to the following amendment of the pilot law, passed by the legislature of the State of New-York, April 4th, 1857.

Sec. 29. No master of a vessel under 300 tons burthen, belonging to a citizen of the United States, and licensed and employed in the coasting trade, by the way of Sandy Hook, shall be required to employ a licensed pilot; but in case the services of a pilot shall have been given, the pilot shall be entitled to the rates established. If the master of any vessel above 300 tons burthen, and owned by a citizen of the United States, and sailing under a coasting-license to or from the port of New-York, by the way of Sandy Hook, shall be desirous of piloting his own vessel, he shall first obtain a license for such purpose, from the Commissioners of pilots, who are hereby authorized and required to grant the same, if such master shall, after an examination had by said commissioners, be deemed competent; which said license shall be and continue in force one year from the date thereof, or until the termination of any voyage during which the license may expire. For such license, the master to whom it shall be granted shall pay to the said commissioners 4 cents per ton. All masters of foreign vessels, and vessels from a foreign port, and all vessels sailing under register, bound to or from the port of New-York, by way of Sandy Hook, shall take a licensed pilot; or in case of refusal to take such pilot, shall himself, owners or consignees, pay the said pilotage as if one had been employed, and such pilotage shall be paid to the pilot first speaking or offering his services as pilot to such vessel.

Any person not holding a license as pilot under this act, or under the laws of the State of New-Jersey, who shall pilot, or offer to pilot, any ship or vessel, to or from the port of New-York, by way of Sandy Hook, except such as are exempt by virtue of this act, or any master or person on board a steam-tug or tow-boat, who shall tow such vessel or vessels, without such licensed pilot on board such vessel or vessels, shall be deemed guilty of a misdemeanor, and, on conviction, shall be punished by a fine not exceeding $100, or imprisonment not exceeding sixty days; and all persons employing a person to act as pilot, not holding a license under this act, or under the laws of the State of New-Jersey, shall forfeit and pay to the Board of Commissioners of Pilots, the sum of one hundred dollars.

The provisions of this act shall not apply to vessels propelled wholly or in part by steam, owned or belonging to citizens of the United States, and licensed and engaged in the coasting-trade.

FIXED LIGHT ON CAPE CABALLERIA.—The Minister of Marine at Madrid has given notice that on and after the 1st day of March next, a light will be established on Cape Caballeria, on the north coast of Minorca, one of the Balearic islands.

The light is a fixed white light. The illuminating apparatus is a catadioptric lens, of the second order. The light is placed at an elevation of 308 English feet above the level of the sea, and should be visible from the deck of a ship, in clear weather, at a distance of twenty miles.

The height of the light tower, its construction, appearance from seaward, and color, are not stated.

It stands in lat. 40° 5′ 40″ N., lon., 4° 9′ 22″ E. from Greenwich.

By command of their Lordships,

JOHN WASHINGTON, Hydrographer.

Hydrographic Office, Admiralty, London, Feb. 20, 1857.

This notice affects the following Admiralty charts:—Mediterranean General, No. 2158; Coast of Spain, Alicante to Palamos, No. 1187; Minorca, No. 146; also, Mediterranean light-house List, No. 25.

The government of San Salvador, by a decree of 15th of November last, has decla port of Libertad a free port.

Notice is hereby given that the Pollock Rip Light-vessel has been replaced

C. H. B. CALDWELL, Light-house Insp

Boston, March 9, 1857.

OUR STATE ROOM.

New-York, *Apl.* 20.—The *Wabash* sailed on the 18th The *Supply*, Lieut. Commanding Gray, is ready for sea—for the Brazil station. The *Mississippi* is nearly ready for sea. The *Vincennes* in a forward state of repairs.

Lieutenant H. S. Newcomb has been ordered to the yard, in place of J. E. DeHaven, ordered to the *Decatur*, in the Pacific squadron.

J. Blakely Carter ordered to the receiving-ship *North Carolina*, in place of A. F. V. Gray, ordered in command of the *Supply*.

Ex-Alderman Herrick sworn in as Naval Storekeeper, in place of D. Delavan, Esq., removed.

Capt. A. S. Taylor, U. S. Marines, detached from the *Merrimac*, and ordered to the marine barracks, New-York.

Capt. R. Tansill, U. S. marines, to receiving-ship *N. Carolina.*

Boston, *Apl* 20.—The *Merrimac* has wound up her 15 months' trial trip, by proving her defective ventilation—being a new ship with yellow-fever on board, without having lain long in any unhealthy port. She is now to be laid up! So much for the utility of the first of the six new steam frigates. The crew and nearly all the officers are transferred to the *Roanoke*, at Norfolk—a good move for testing the comparative merits of the two steamers.

The *Cumberland* flag-ship, for the African squadron is nearly ready for sea.

Norfolk, *Apl.* 20—The *Minnesota* has been ordered here from Philadelphia, to take in her battery, &c., preparatory to sailing for the East Indies.

The *Roanoake* is all ready for her crew from the *Merrimac.*

Purser C. J. Emery has been ordered to the *Levant*, East Indies, in place of Purser Cahoon, detached in consequence of illness.

Courts of Inquiry.—Two new ones have been convened in Washington—three now being in session, for the dispatch of business, while all have work enough to last them until *reformed* by another Congress. The average of each case for investigation is about two weeks. The object of the Department is, if possible, to fufill the last law on the subject, in time to lay the whole proceedings before Congress at as early a day as possible, for its action. The whole subject is now involved in such a labyrinth of confusion as to make the result of inquiry wholly inadaptable to the sent personnel of the navy, and nothing short of an increase to the req necessity can by any possibility meet the case. The policy of this measure —increase—is daily becoming more and more apparent, and unless injustice has been carried to an extent far beyond reasonable expectations, an increase of the personnel of the navy, to such an extent as will at least take in all who have been unjustly retired, is fully called for by the wants of our unprotected commerce.

THE

U. S. Nautical Magazine,

AND

NAVAL JOURNAL.

VOL. VI.] JUNE, 1857. [No. 3.

DESIGN AND DRAUGHT OF A STEAM REVENUE CUTTER FOR THE GOVERNMENT.

THE call of the Treasury Department for the "strongest, fastest, and best" vessel for the revenue and relief service off the port of New-York, as might have been expected, induced a stride in nautical progress of which the world is welcome to reap advantage. Under the terms of the Hon. Secretary's advertisement, we felt bound to enter the lists of competition, and abide the issue—having given the world some proofs of our sincerity in urging forward the car of progress, we felt that the time had come for a new demonstration of our earnestness. At the present writing, the Commission appointed to investigate the models, specifications, and proposals, are busily engaged in their duties, and the result is yet far from a determination. This shall not deter us from a publication of our plans, however, having been first conviced we were *right* before presenting them for examination.

Our models, (of which there were three, of different tonnage, two being modelled on the principle to be explained), specifications, and proposals, were designed in view of the "strongest, fastest, and best" sea-going steamer sailing in American waters, at the date of her construction, and especially adapted to the arduous service of a steam-tug and relief-vessel; to be in the strictest sense a *life-boat*, secure against flood and fire, employing steam, not only to contend against the wind and sea, but to work ship and pump, weigh anchors, hoist coal or cargo, to pump or tow a distressed vessel, to warm ship or extinguish fire—this vessel to have draught of water that may be approved for appr modelled as to be an able ship at sea in the sea-going vessels would fain seek a harbor *Petrel*, tendering assistance to the ice-burde crew, as it approaches the coast, having suc

able her to run fearlessly into ice, to the relief of imperiled vessels, and to have all the adaptation required to make good weather in the heaviest gale, either in working guns, as a war vessel, or employing her power as a relief-vessel; to be planned, equipped, and furnished, in the most convenient, comfortable, and suitable manner.

The dimensions of the model, the plans of which are given herewith, and which has our own preference of all those offered to the Department, are as follows:

Length on deck	181 feet.
Moulded breadth	31.75
Depth of hold	11-5
Tonnage	666 25-95ths tons.
Draught of water	8.25

Accompanying the specifications was a chart of the exponential solids of displacement, illustrating a new and simple mode of comparing correctly the relative resistances of vessels of different type. It exhibited the exponential solids of vessels by the most celebrated builders, their relative speed and sea qualities being known, a ready means of comparing our models with them was thus afforded the Commission.

A just comparison of models cannot be made by the eye alone, even though they were all made upon the same scale, inasmuch as the secrets of their configuration are problems in practical geometry; nor are drawings any better guides. The laws of geometry forbid the comparison of solids by surfaces—solids can only be compared by solids, surfaces by surfaces, &c. It is equally true that it is of little consequence, for direct velocity, how the transverse sections of a vessel are formed, so long as they have sufficient area for the required displacement, and are properly located in the line of length—the shape of the transverse sections has reference to lateral and transverse motion chiefly. The proper distribution of the section areas, or, in other words, of the displacement along the line of length, is the all-important feature pertaining to speed. This the celebrated Chapman discovered in the early part of this century, and he endeavored to find the law of the adjustment of shape. He did not succeed, however, and for comparing the bodies of vessels, his parabolic system will be found wholly useless. The new system furnishes all that we require, and will be fully explained in some future number of the *Magazine*; for the present, it will suffice to refer to the accompanying plate, where Fig. 1 shows the exponential curve of displacement of the steam revenue cutter. Fig. 2 represents that of the Mexican war steamers, *Santa Anna*, and *Iturbide*, and Fig. 3 that of the steam-tug *Leviathan*.

The steamers were designed for a speed of *ten* knots in an ordinary seaway, and on their voyage to Vera Cruz they steamed eleven knots, while

with steam and canvass united, their performance reached fourteen knots an hour. The steam power was only of "auxiliary" proportions. It will be observed that the cutter exhibits much finer lines at the extremities, with greater midship body, at 7½ feet draught of water, (without keel,) than the war vessels do at 8½ feet, without keel. The cutter model is, therefore, vastly superior in the points of speed and stability.

With regard to the *Leviathan*, she was the swiftest and most powerful steam-tug ever used in the harbor of New-York, or on the Atlantic coast. On one occasion she ran from New-York to Newburyport, Mass. in 20 hours, remained there 1½, and then left with the ship *Dreadnought*, 1400 tons, in tow, for New-York. She arrived at anchor in the East River in 37 hours, being gone from New-York only 58½ hours. The wind was light and ahead, and the entire distance was 780 miles. The average speed running to Newburyport, 19½ miles an hour; average speed towing the *Dreadnought*, 10½ miles.

In comparing the *Leviathan* with the cutter, it will be perceived she was very inferior in the regular distribution of displacement for speed, yet her model is equal, if not superior to most vessels of her class. Her immersion is of about equal depth with the cutter.

In making a proposal for the construction of a government vessel, we were not willing to aim at no higher or better mark than that of the steamers to which we have referred. It was sufficient to know that these vessels, unequalled in their day, were constructed for the service of a foreign government, in one instance, and for citizens in the other, to anticipate what ought to be required by the United States for a steam vessel combining the specialities of each, to be built at the present time. And although a member of the Commission expressed his opinion that "so high speed was not wanted," it remains to be seen what standard shall be deemed the "fastest," according to the views of the Department, or whether the "fastest" shall be pronounced *too* fast. In model, specifications of hull, engines, and equipments, our aim was to design a vessel acceptable to the government, and beyond doubt or cavil, superior to any of the same class, or for similar service, in the known world. This we conceived to be the desire of the Treasury Department.

Our model and specifications were made for an amount of propulsory power equal to 600 horses, (as commonly computed), with which a of 18 knots, or 21 miles, could be realized as performance, when enced by weather.

SPECIFICATIONS OF HULL.

Keel.—To be of white oak, sided 14 and moulded 16 inches; scarphs to be not less than six feet long, and bolted together in the strongest manner.

Stem, Apron and Stern-Post.—To be of live-oak.

Frame.—Below 2d futtock heads to be of white oak; above, of live oak and Long Island locust, with cedar half top timbers. To have shifts of butts of not less than 4½ feet, and to have no butts on the keel; limbers to be cut out of centre of the top of keel, and frame, and bilge limbers to be cut out of middle of bilge strake in outside planking. The spaces between the frames over the keel to be filled in solid excepting a space of 2 inches, next to the upper surface of keel. To side the lower futtocks 10 inches, middle 9 inches, and the top timbers 8 inches. To mould at keel 14 inches, at centre of bilge 10½ inches, at upper deck 5½ inches, and at rail 4½ inches.

Timbering Room.—At midships 28 to 30 and 32 inches at ends of vessel.

Solid Filling.—Frame to be filled in solid with yellow pine for a distance of 18 inches, both above and below load line of flotation, to prevent being cut through with ice.

Deadwoods.—To be of white oak, sided same as keel, and adjusted in height to furnish a lodgment for the cants to meet on the top at centre, and to receive a cross-tie connecting the cants from opposite sides.

Keelson.—Main keelson to be of plate iron to extend up to the lower deck, and so constructed as to serve for water-tanks, and give tenfold longitudinal strength to vessel. It shall be thoroughly secured to the frame upon and through a six-inch strake of oak, worked along the throats of the floors to receive it, and its inside divided into compartments.

Coal Bunker Kelsons.—Shall be of oak, of proper size, strongly secured to the frame for the reception of the coal bunkers, which will extend the length of main deck and be described hereafter.

Tanks.—The capacity of hollow iron keelson as a tank to be equal to 6,500 gallons, and to extend quite fore and aft, through engine-room and under the boiler, which shall be fitted to stand over and rest upon the same, if necessary.

Port Timbers.—To be of locust, doubled to rail, with cedar half top timbers; battery frames to be doubled to rail, with cedar above planksheer; bulwarks to be solid forward of engine on main deck, and to be planked with white pine 2 inches thick.

(*To be continued.*)

MAGNETISM.

From PROF. HENRY'S *Reports of the Smithsonian Institution.*

THE *Phenomena of magnetism,* which a few years ago were only recognised as existing in iron, and in a slight degree in a few other metals, are now known to belong to all matter; and with those of electricity, with which they are intimately connected, either in the relation of effect and cause, or the concomitant effects of a more general principle, are probably displayed in every part of the material universe. Recent researches render it probable that the sun and moon exert a magnetic influence upon our earth. Were the study of this mysterious principle immediately connected with none of the physical wants of man, or with the arts of life, it would in itself be an object of high interest; but when we reflect how dependent upon it is the art of navigation, and how extensively it is employed in this country in tracing the divisions and boundaries of land, we are, from utilitarian considerations, induced to give it the most minute and laborious investigation.

It is now known that the magnetic needle is never at rest; that it is the subject of various changes, some depending upon the hour of the day, others upon the season of the year, others again upon longer periods of time.

It also varies in its direction at different places. Between the Atlantic and Pacific coast, or, for example, between Massachusetts bay and the mouth of the Columbia river, there is a variation of upwards of twenty-four degrees; but this variation is not constant even at the same place, but changes from year to year. With these changes it is necessary that the navigator should be familiar. It therefore becomes a matter of national importance that observations of these phenomena should be made at as many places, and those as widely separated from each other, as possible.

The Smithsonian Institution has endeavored to advance this branch of knowledge, by importing at different times, and at considerable expense, four entire sets of apparatus, besides separate instruments, for determining the direction and intensity of the magnetic force.

These instruments have been lent to observers, and in some cases sold to the government for the use of exploring parties, and have done, or are now doing, good service, in adding to the stock of facts which, by the process of induction, are to yield a knowledge of general laws.

It will be recollected that an appropriati[illegible] n of the Regents for supplying magnetic in[illegible] edi-tion. These were procured from London [illegible] Dr.

Kane, and, we trust, are at this time revealing to that intrepid explorer the fitful and mysterious changes of the magnetic force.

During the past year, a magnetic observatory has been erected within the grounds of the Smithsonian Institution. It principally consists, to insure an equable temperature, of an under-ground room, enclosed within two walls, between which a current of air is allowed to pass in order to prevent dampness. This observatory has been supplied with a set of apparatus for determining the continued variations in direction and intensity of terrestrial magnetism. By a very ingenious application of the photographic process, the invention of Mr. Brooks, of England, the instruments are made to record, on a sheet of sensitive paper moved by clock-work, their own motions.

First, to determine the variation of direction of the horizontal magnet: a steel bar, strongly magnetized, is suspended by several fibres of untwisted silk, so as to have perfect freedom of motion in the horizontal plane, and from a gas-light, kept perpetually burning, a single ray of light is thrown upon a concave mirror permanently attached to the magnetic bar, and consequently partaking of its movements. This ray of light is reflected and brought to a focus at the surface of a revolving cylinder, moved by clock-work, on which the photographic paper is placed. When the magnet is at rest, the pencil of light is stationary, and consequently traces, on the moving paper, a simple straight line; but when the magnet is disturbed by terrestrial perturbations, its oscillations are recorded by the motion of the pencil of light in a curved or zigzag line.

To register the intensity of strength of the magnetic force, another bar magnet is suspended by two parallel silk threads about an inch apart, descending from two hooks fastened to the under side of a plate attached to the ceiling or some other support. The plate is then made to revolve through an arc of a circle until, by the force of torsion, the bar is deflected from a north and south to an east and west direction. It is thus kept in a state of equilibrium between the force of torsion of the threads, tending to turn its north end round still further to the south, and the magnetism of the earth, on the other hand, tending to bring it back to its north and south direction. If in this position the magnetism of the earth becomes stronger, it will prevail, and the north end of the needle will turn towards the north; if the magnetism of the earth diminishes in intensity, the force of torsion will prevail, and the same end will move towards the south. These motions, as in the case of the other magnet, are recorded by a beam of light on the paper surface of the revolving cylinder.

But besides the change of direction of the horizontal needle, a magnet so supported as to be free to take any position, in this latitude will arrange itself with its north end dipping down towards the horizon. The amount

of this dip, or variation, varies also in different places, and at different times; and to record these changes a bar is supported, in the direction of the magnetic north and south, on two knife-edges like the beam of a balance. Any change which takes place in the position of a magnet thus arranged, is recorded by a mirror attached to the prolongation of the axis on which the bar turns.

It is proposed to keep these instruments constantly in operation, for the purpose of comparing results with other observations of a similar character in different parts of the world; and also for the purpose of furnishing a standard to which the observations made at various points by the Coast Survey, and the different scientific explorations which are now in progress in the western portions of the United States, may be referred, and with which they may be compared.

This establishment ought to be supported by government; but as no provision has been made for it, and as the wants are pressing, in order to render more valuable the observations making in other countries as well as our own, the Smithsonian Institution, in connexion with the Coast Survey, has undertaken to commence it. In accordance, however, with the policy which has thus far governed the acts of the Institution, this observatory will be turned over to other hands as soon as other means are found for its support.

The other sets of magnetic instruments mentioned, which have been imported by the Institution, are intended to furnish portable magnetic observations, in which the dip and the intensity are recorded by the pen from direct and personal observations.

Besides the facts which will be collected by the Coast Survey along our extended seaboard, those which the various exploring expeditions are furnishing, and those obtained by the instruments belonging to the Smithsonian Institution, a large number of records of observations exist as to the position of the magnetic needle in different parts of the United States in past times. A collection of these, and a comparison of them with more recent observations, would serve to throw light on the changes which have taken place in the course of years.

There is, also, on record in the land office, an extended series of observations which, though not made with great precision, will still be of value in delineating the general direction of the magnetic lines in different parts of the United States. Steps have been taken to collect all the materials relative to this subject, with the view of submitiing tl time to reduction and careful investigation.

THE NEW CLIPPER BARK YOUNG TURK, OF BOSTON.

We find the following business-like description of this fine vessel in the Boston *Atlas*, and as she is fitted with a *new rig*, we introduce her to our readers. It would give us pleasure to be placed in possession of her lines and spar-draft, for publication.

This is a beautiful little vessel, of 350 tons register, designed for the Mediterranean trade. She is 116 feet long on deck, has 28 feet breadth of beam, and 13 feet depth of hold. She has a sharp, flaring bow, with concave water-lines, and an oval stern, which swells between the quarter-timbers, and between the arch-board and the rail, but is curvelinear in the wake of the monkey-rail. The bow is ornamented with a full figure of a young Turk, placed to correspond with the rake of the cutwater, and her stern is set-off with gilded carved work. Her dead-rise at half-floor is 12 inches, rounding of sides, 6 inches, and sheer, 3 feet; graduated her whole length, and terminates in a boat-like spring forward.

Her cabin-house is built into a half-poop deck, and is 31 feet long by 18 wide, and 6½ high. The cabin is tastefully designed, having recess sofas, large state-rooms, a pantry, and other useful apartments. It is also neatly-furnished, well-lighted, and ventilated.

The house for the galley, crew, &c., is abaft the foremast, and is 28 feet long, 16 wide, and 6 high. The sailors' quarters are quite snug and comfortable. She has Briggs's ventilators in each corner of her houses, and is well seasoned with fine salt.

Her frame is of white oak, her scantling and deck frames of hard pine, and she is square-fastened throughout. Her keel is sided 13, and moulded 22 inches, floor timbers, 12 by 14, keelson, 12 by 14, and rider 12 inches square, the whole bolted in the best style. The ceiling on the floor is 3 inches thick, and the rest of the ceiling is 5 and 4½ inches, the clamps scarphed and keyed. She has 6 partner beams, 2 to each mast, and these rest upon a strake of 8 by 14 inches, and are kneed together. Her deck-beams are 12 by 14 inches, strongly secured to the sides with hanging and lodging knees, and supported amidships by staunchions of 8 by 9 inches, which are clasped with iron, and bolted above and below. She has two pairs of pointers forward, filled in with hooks, and one pair aft, all bolted alternately, from both sides. Her waterways are 12 by 14 inches, deck-plank 3 inches thick, and main-rail and planksheer each 4 inches. The outside planking varies from 3 to 4½ inches in thickness, is butt-bolted with copper, square-fastened with spike and treenails, and her bottom is sheathed with yellow metal. She is is strongly and neatly built, and, with fair play, will wear well.

She has a new rig, invented by Capt. John Humphrey. It consists of double topmasts and double topsail-yards. The second topmast has cross-trees, doublings, and cap, and is fitted for the upper topsail, which also contains a single reef. When the upper topsails are furled, the vessel is then under the same surface of canvass represented by double reefs in the old rig, and when the lower topsails are reefed, she is under close-reefed topsails. Her courses are not so large as those of the old rig, and are expected to stand while she can bear her lower topsails without a reef. The object in this rig is the same as that contemplated by Forbes' rig, excepting the diminished size of the courses, viz.: to make and take in sail with rapidity and ease. She carries studding-sail booms on both topsail-yards, consequently her studding-sails are also small, and can be easily managed. Her masts rake, commencing with the fore, 1, $1\frac{1}{4}$, and $1\frac{1}{2}$ inch to the foot, and are 51, 54, and 59 feet long, including $9\frac{1}{2}$ and $8\frac{1}{2}$ feet heads. The fore and main topmasts, &c., are alike, viz.: 24, $23\frac{1}{2}$, 14, and 11 feet long, with poles of 7 and 8 feet. The mizzen topmast, &c., are 25 and 10 feet, and pole 7. The yards upon both masts are also alike, as follows: 55, 47, 38, 32, and 26 feet square. Her bowsprit is 16 feet outboard; jibboom divided at 16 and 10 feet, with 3 feet end; spanker boom 28, and gaff 24 feet. She is neatly and strongly rigged, and looks finely aloft. Captain Humphrey has applied for a patent for his rig.

No expense has been spared in her outfits, and take her as a whole, she will compare favorably with any vessel of her class belonging to the port. She is owned by Messrs. Alpheus Hardy & Co., and others, and is commanded by Captain Elisha Harding, who enjoys the reputation of being a first-rate sailor.

Mr. James O. Curtis, of Medford, built her, and, like all his vessels, she rates A 1, and what is more, in the opinion of our Marine Inspectors, fairly merits her high classification.

Crossman's Rudder.—Messrs. Editors:—Having read, on p. 453, preceding volume of the *Magazine*, that a rudder there described "never pitches out of the water, as the common rudder does frequently in flat coasters," I beg to say that I cannot endorse such a statement, never having heard of a common rudder "pitching out of water," and I have followed the seas for 47 years. Barnacle.

Did "Barnacle" ever "hear" of a rudder pitching *into* the water, and if it pitches into it, it follows that it must "pitch out" of it. If it neither pitches out of the sea nor into it, then the vessel never pitches! We thi our meaning is clear to any "Barnacle," or even *crab*, who is accusto to reading and observation.

YACHTS AND YACHTING IN ENGLAND.

BY P. R. MARETT.*

THE great want of scientific principle in the construction of yachts, must be evident to every one who has given the subject any consideration, and it is on account of this want, that so few yachts are built which answer the expectations of the builder or owner. The deficiency may be traced to two principal causes, first to the imperfect knowledge of the theory of Naval Architecture, which the generality of our yacht builders possess, and secondly to the very slight inducement for any improvement given by the yacht clubs. Although the builders are undoubtedly men of great experience, still the very nature of their employment prevents that careful study of the scientific part of their business which can alone produce a competent Naval Architect; in fact Naval Architecture is with them of secondary importance, instead of demanding the greater share of their attention. In other constructive arts there are two distinct branches, the architect to whom is entrusted the design, and the builder whose business it is to carry out the design, and whenever these seperate branches of a trade have been united, mediocrity has invariably resulted, because the time and attention requisite to produce proficiency in either branch, prevents more than a partial knowledge of both.

The yacht clubs have hitherto done little to improve the construction of vessels: their prizes are offered for speed only, and that speed must be measured by an arbitrary standard, which has not only ceased to be a correct measure, but is found to engender a very bad form of yacht. At present the yacht clubs are placed in an anamolous position—the members individually are unanimous in opinion that the present class of clipper-cutters is deficient in every requisite of a good yacht, except speed: even those who possess such vessels, are frequently afraid to trust themselves in their own craft; but collectively they agree in shutting their ears to any improvement whatever. Virtually no rig but the cutter, [sloop,] with its immense and ridiculous balloon sails, is to contend in their races, nor is any but the most exaggerated form of hull permitted to enter the lists with any chance of success. Any remedy for these last mentioned errors, is difficult to suggest; but in the way of improving the scientific construction, and ensuring that a yacht shall answer the expectations of her constructor, the yacht clubs may accomplish much by insisting upon a proper drawing of every yacht entered for a race, being deposited in their custody, to be retained as club property. This would ensure a certain degree of attention being paid to the construction of racing yachts, and although

* Yachts and Yacht-building, London, 1856.

there might be some repugnance at displaying supposed secrets of the trade, still the feeling is somewhat selfish and unsportsmanlike, and would no doubt soon be overcome.

The London yacht clubs have recently adopted the following rule for measuring yachts for racing purposes:—The length shall be taken in a straight line at the deck from the fore part of the stem to the after-part of the stern-post, from which deducting the breadth, the remainder shall be esteemed the just length to find the tonnage; and the breadth shall be taken from the outside of the broadest part of the yacht, then multiplying the length by the breadth so taken, and the product by half the breadth, and dividing the whole by 94, the quotient shall be deemed the true tonnage, provided always that if any part of the stem or stern-post project beyond the length taken as above mentioned, such projection shall, for the purposes of finding the tonnage, be added to the length, taken as beforementioned, and that all fractional parts of a ton be considered as a ton.*

As the subject of measurement is so closely connected with the improvement of yachts, we shall examine the question rather minutely, and in so doing, give a slight sketch of the past history of racing yachts, and endeavor to show how far club-measurement has effected them, and what is really required in any club-measurement.

For many years after the establishment of the Royal Yacht Squadron, yachtmen seem to have been afraid of anything new, and to have deferred to the notions of sea-going and "experienced" men. The full bow and fine run were the peculiar characteristics of the fastest yachts of each class, and although improvements of form were gradually effected, yet the "cod's head and mackerel's tail" was the only admired construction. From experience it was found that such vessels measured by any standard, were deficient in nearly every essential for speed. The hull above water was ponderous and large, thus rendering the vessel crank and exposing a large surface to the wind. At sea the full bow is very detrimental to speed, each successive wave nearly stopping and frequently striking the hull with dangerous violence. The only thing to be said in favor of this form, is that vessels so constructed, are comparatively dry; but this dryness is invariably purchased at the cost of velocity, as a vessel moving slowly, can hardly be expected to throw the water over herself. These vessels had a midship section more resembling that of the *America* than of the nar-

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* This is the most arbitrary and absur [illegible] tonnage. It appears to have in view the indefinit [illegible] night be built of capacity in the ratio of *four* [illegible] equal tonnage.—[Eds.

row clippers which succeeded them: the greatest width was considerably above the water line; the stern-post was upright, or nearly so, and the deck very round forward. On a modification of this type, the *Arrow* and *Alarm* were built, and the very decided improvement effected in both these yachts by being lengthened forward, affords a convincing proof of the march of improvement in the form of fast vessels made latterly. The *Alarm* for many years was looked upon as the champion yacht, until a new class of vessels constructed upon diametrically opposite principles appeared; and the fact of the *Heroine* of thirty-five tons beating the *Alarm* in a race at Cowes, drew general attention to the yachts built by Mr. Wanhill, of Poole.

To Mr. Wanhill must be awarded the praise of originality. He saw the errors of the match-sailing system, and profited by them. It is unfair to place the vessels built by him ten years ago, in comparison with those now built; but they stand out in strong relief from those that immediately preceded them. In fact, it is not too much to say, that the introduction of the Poole vessels made a far greater stride towards an improvement in speed, than was made by the *America.* Immediately upon their appearance, a revolution was effected in the form of every yacht intended for racing, and spread itself insiduously into nearly all classes of yachts. Mr. Wanhill was the first builder who had the courage to build vessels much sharper at each extremity than any then existing; he raked the stern-post and increased the depth, thereby obtaining a larger vessel without increase of tonnage, according to the old law; and seeing that breadth was the principle dimension in tonnage, he decreased the breadth; at the same time by increasing the depth, and employing lead for ballast, he both lowered the centre of gravity, and increased the capacity for ballast, thus enabling his vessels with small hull, to carry a large area of sail.

The chief characteristics of the Poole vessel were then the raking stern-post, great fineness of the water-lines at both extremities, great draught of water, a reduction of breadth, lead ballast, and enormous sails. Although the object of speed was attained by these means, it was met by serious counterbalancing evils: there is little comfort at sea in such vessels—the great weight of ballast makes them plunge heavily, they are wet, require a numerous crew to work the sails, and there is little room below for the owner. However, where speed was the object, these vessels found particular favor, and many yacht-builders, following in Mr. Wanhill's wake, designed vessels on similar principles, if not with similar success.

On this system our clippers were constructed until the arrival of the *America*, [built by the late George Steers, of New-York,] made a third era in yacht building. She differed from the Poole vessel in every respect

excepting the large sails; she had little ballast,* was rather shallow than otherwise, had an upright stern-post, great breadth, remarkably sharp water-lines, and her main breadth was much further aft than was then general. This gave her a great advantage at sea, as from her small displacement she was not only lively, but affected by the action of the waves less than a vessel with a fuller bow and greater weight. But it was not only at sea that the *America* was remarkable; she gave convincing proof of her speed on more than one occasion, and hence arose an almost superstitious admiration for anything American applied to yachting. That the *America* was a vast improvement on our yachts in many respects, no one will deny, but she has generally been measured by one standard and admired by another. The idol has been admired for her speed, as compared with our schooners, and measured for her accommodation, as compared with our clippers; or rather in admiring the talent of the Americans designing their craft, we have forgotten to blame ourselves for placing a barrier against improvement in the construction of large yachts. With our miserable tonnage laws, we could never hope to compete with the untrammelled American; our fastest vessels were such small cutters as were able to avail themselves of a shuffling evasion of tonnage. Applied to larger craft this evasion was inadmissable, hence little or no improvement is to be traced in the construction of large class yachts for many years prior to 1851. However, the *America* set our builders to work, and nothing was to be seen but long bows, or lengthened bows. In many instances this has been carried to an absurd extent, proving how little science has been brought to assist the naval architect. The success of the *America* is to be attributed to a far more intricate combination of qualities than those who see nothing remarkable about her except the sharp water lines, imagine. She had evidently been constructed with great care, her centres of gravity were well adjusted, the sails balanced with considerable skill, and what was probably of still more importance, she had an excellent crew. In the majority of those yachts built in England since 1851, the *America* has been adopted as a model, but instead of analysing the elements of that vessel before attempting to copy her, our builders have dashed blindly at the long bow, and omitted every other part of the original; yet the builders are not altogether to blame—they have to supply vessels built in accordance with the prevailing taste, and thus, in many instances, yachts were constructed which differed materially from what the better judgment of the h[illegible]ested.

The application of the tonnage law [illegible]es has acted most preju-

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* We think the writer has not discover[illegible]ad; it was chiefly under the ceiling between the frames.—[Eds.

dicially to the interests of the yachtsmen; certain classification and measurement has been adopted, but it has frequently happened that some one yacht, availing herself of the defects in the tonnage-law, has particularly distinguished herself; wherever she appeared, the entries diminished in number; the sailing committees finding the regattas on the decline, made some stringent rules, pointed exclusively at bringing the fast yacht to the level of the slower, and no sooner did a small yacht succeed in vanquishing a larger one, than the "time" hitherto allowed her, was abolished. The sole aim of the sailing committee appears to be the sustentation of their races; they forget that in the natural course of things, an improvement in the form of yachts takes place, and the fact of the small vessel beating a larger, is but an indication of advancement in the right direction, and shows that their efforts in encouraging a swifter class of vessels, have met with success beyond their expectation; that the vessels are bad, is the fault of the system and of the measurement, and the remedy consists in substituting a better system and better measurement.

It therefore appears that the club measurement has had a great, but most pernicious influence on the construction of yachts and in the promotion of sport; and before a remedy can be applied, it will be necessary to determine by what standard their speed is to be measured; whether the speed is to be positive or comparative, whether it is the actual speed through the water without respect to any consideration of the size of the vessel, or whether it is the speed of one vessel compared to that of another of different dimensions. Now, this is most important, because it may happen that unless the measure be a good one, the comparison may be unjust, as the larger vessel may be the slower. Bearing in mind that the object of a sailing-match is that the fastest vessel should win, and that where two or more yachts of unequal sizes are matched, the fastest in proportion to size, should win, we require a means of estimating the size, and so handicapping them that the best yacht shall not sail under any disadvantage. The present tonnage measurement has been productive of the present class of racing yacht, a class which no one can wish to see perpetuated, as it includes very many bad features. As a substitute, some of the clubs have adopted a modification by taking the length aloft instead of the length below. This is probably an improvement, but will merely affect the rake of the stern-post. Some experienced yachtsmen advocate one simple measure, that of length only, but this is doubly objectionable, as it admits unlimited breadth and unlimited depth; thus we should have broad yachts, which from their form would have great stability, and consequently carry large sails, entailing all the miseries of unseaworthiness, expense, and deficient accommodation. Other propositions for an amended plan of measurement have been suggested, but they all appear to be

based on a wrong foundation; they contemplate merely an alteration of the existing tonnage, and the substitution of some other measure of the capacity of the vessel whereby to measure her speed. These two things—speed and capacity—are so opposite, that they can hardly be reconciled or compared. We have seen the *Heroine* beat the *Alarm*, the *Arrow* and *Mosquito* beat the *America*, yet no one thought the *Heroine* a better vessel than her opponent, or would have preferred either of the cutters to the schooner.

What then is really required is, first, a measure of the hull for club purpose, or as a means of comparison; and second, a measure for racing purposes. For the former, the old tonnage may be as good as any other measurement; and for the latter we require some limit which may admit of a fair and equitable classification or means of handicapping for a race, while it leaves the naval architect at liberty to construct his vessel on any system which he may think proper, without permitting him to infringe or evade the measurement. Not only should this unit of size offer inducements to improve the forms of yatchs, but it should aim at an improvement in the rig and arrangement of the sails. When such a measurement is established, we may hope for the substitution of correctly modelled yachts, in lieu of the oversparred and overmanned vessels which are to be found at the starting buoys of every regatta.

The fact is, the only correct measure of a yacht for racing purposes, is the measurement of the sails. Its great simplicity and practicability are only secondary recommendations to the evident advantages to be derived from its adoption; no valid objection except that of novelty has ever been raised against it, and the most beneficial results are to be expected were this method of measurement applied to racing craft. This is more particularly apparent when preparing a drawing for a racing yacht. The first question naturally is, what vessel is it required to beat, and by what means is she to be beaten? By larger sail or by larger hull, or by observing the same dimensions precisely? It never occurs to us that the end is to be attained by reducing any part of the original. If the sail is increased, we gain an advantage over our opponent which should attract the attention of the handicapper quite as much, or more, than an increase in what is settled to be no longer a measure of the hull. If with smaller sails we outsail our rival, who can say that an improvement in the form of our vessel is not the cause. We have given the owner a yacht of equal size, and of greater velocity, requiring a less crew, and consequently of less cost to maintain, and with some additional internal space.

By the present system, the attempt to improve, is disc
and a set form of vessel which is daily abused by its pr
upon us; and no one yacht club is yet found bold

some substantial correction of a system which they all acknowledge to be fundamentally wrong. The only objection to the measurament of the area of sail, is that the innovation is too great; but it must be borne in mind that the remedy should be proportional to the disease, and surely the disease is great enough: all half measures or patching of bad ones, are of little or no avail; it has and will only beget fresh evasions, to be met by fresh alterations, without in any way producing yachts constructed on better principles than those we have at present.

It may be considered doubtful whether the actual sails could be measured, and therefore a method of approximating to the correct area has been suggested; but there can be no difficulty about measuring the sails themselves, and in so doing it is a question whether the largest top-sail and the largest jib should be included: by including them, balloon sails would cease to appear, and when a yacht of any different rig than the usual cutter or schooner, ventured to race, she would contend on even terms as to sail at least; or if, as is frequently the case, some yachtsman would start his vessel, well knowing her powers in sailing to windward, but also aware that without balloon sails, his hardly contested laurels would be snatched from him by some sailing machine that can double his spread of canvass when before the wind, then the oversailed clipper must allow his adversary "time" in proportion to the additional sail, or else not hoist it.

One of the prominent advantages of the adoption of the sail measurement is, that the most difficult questions in match-sailing, would meet with an easy solution. When the number of crew is proportional to the work to be done, or in other words, to the sail they would have to set and work, there could arise no dispute on this head. Again, the allowance of time for additional size, can be so admirably arranged when the area of sail is the racing measure of size, that when once a good time table was established, all trouble or annoyance on this score, would be obviated. Unless there is an allowance of time for size, the sail measure loses half of its evident advantage, and the races their interest; with it, yachts of different sizes and rigs can contend in the same race with a fair chance of winning; without it, only one size of yacht can have a chance. The following time table, adapted to the sail-measure, is a part of the system of measurement now advocated; in fact, in all matters of racing, the time table is of as much importance as the measurement. The table was constructed on a careful consideration of the performances of *Mosquito*, *Volante*, *Secret*, *Phantom*, *Vampire*, and *Vesper*, which had sailed so often together, that the time of either of these yachts could beat the others, was known to a nicety. It may be added that a vessel of twelve tons, sets about 1,500 feet, and a vessel of fifty tons, sets about 4,500 feet.

TABLE OF TIME FOR DIFFERENCE OF SIZE IN YACHT MATCHES.

Area of Sails.	6 hours.		6½ hours.		7 hours.		7½ hours.		8 hours.	
	Time.	Diff.	Time.	Diff.	Time.	Diff.	Time.	Diff.	Time.	Diff.
	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
1500	42	—	48½	—	55¼	—	62½	—	70	—
1600	39½	2½	45½	3	52	3¼	58½	4	65½	4½
1700	37	2½	42¾	2¾	48¾	3¼	54¾	3¾	61¼	4¼
1800	34½	2½	40	2¾	45¾	3	51¼	3½	57¼	4
1900	32¼	2¼	37½	2½	42¾	3	48	3¼	53½	3¾
2000	30	2¼	35	2½	40	2¾	45	3	50	3½
2100	28	2	32¾	2¼	37½	2½	42¼	2¾	46¾	3¼
2200	26¼	1¾	30½	2¼	35	2½	39½	2¾	43¾	[illegible]
2300	24½	1¾	28½	2	32¾	2¼	37	2½	40¾	3
2400	22¾	1¾	26½	2	30½	2¼	34½	2½	38	2¾
2500	21¼	1½	24¾	1¾	28½	2	32¼	2¼	35	2½
2600	19¾	1½	23	1¾	26½	2	30	2¼	33¼	2¼
2700	18½	1¼	21¼	1¾	24½	2	28	2	31¼	2¼
2800	17¼	1¼	19¾	1½	22¾	1¾	[illegible]	2	29	2
2900	16	1¼	18¼	1½	21	1¾	24¼	1¾	27	2
3000	15	1	17	1¼	19½	1½	22½	1¾	25¼	1¾
3100	14	1	15¾	1¼	18	1½	20¾	1¾	23½	1¾
3200	13	1	14½	1¼	16½	1½	19¼	1½	21¾	1¾
3300	12	1	13½	1	15¼	1¼	17¾	1½	20	1¾
3400	11	1	12½	1	14¼	1¼	16¼	1½	18½	1½
3500	10	1	11½	1	13	1¼	15	1¼	17	1½
3600	9¼	¾	10½	1	11¾	1¼	13¾	1¼	15½	1½
3700	8½	¾	9½	1	10¾	1	12½	1¼	14	1½
3800	7¾	¾	8½	1	9¾	1	11¼	1¼	12¾	1¼
3900	7	¾	7½	1	8¾	1	10	1¼	11½	1¼
4000	6¼	¾	6¾	¾	7¾	1	8¾	1¼	10¼	1¼
4100	5½	¾	6	¾	6¾	1	7¾	1	9	1¼
4200	4¾	¾	5¼	¾	5¾	1	6¾	1	8	1
4300	4	¾	4½	¾	4	1	5¾	1	7	1
4400	3¼	¾	3¾	¾	4¾		4¾	1	6	1
4500	2½	¾	3	¾	3¼	¾	3¾	1	5	1
4600	2	½	2¼	¾	2½	¾	3	¾	4	1
4700	1½	½	1½	¾	1¾	¾	2¼	¾	3	1
4800	1	½	1	½	1	¾	1½	¾	2	1
4900	½	½	½	½	½	½	¾	¾	1	1
5000	—	½	—	½	—	½	—	¾	—	1

The foregoing table is calculated on the assumption that the allowance of time should bear some proportion to the duration of the race. Thus a vessel the area of whose sails is 3,000 square feet, would allow 24 3-4 minutes to one of 2,000 square feet area in a race of eight hours, but only fifteen minutes if the race lasted six hours; the length of the match to b estimated from the time the first vessel takes in sailing over the course

REMARKS.

We do not endorse the views of the above writer regarding the measurement of a yacht for racing purposes. The area of the sails with any time-table that can be formed, is quite as arbitrary, and may give rise to as many absurdities, as other standards which he has condemned. We think it would be better to classify yachts according to *displacement* and *area* of *sails;* then the problem would be the transposition of given weights with equal power at whatever speeds. Even this arrangement would be liable to objections from considerations of rig, kind of canvass, and its condition at the time of racing. There is still ample room for the exercise of scientific skill in yachts and yatching, and we may some day be induced to enlarge upon the subject.

TUBULAR BOILERS FOR WESTERN RIVER STEAMBOATS.*

Some of the engine-builders in Cincinnati and Pittsburgh, are introducing into boats now constructing for service upon the Ohio and Mississippi rivers, boilers in which the return heat is conveyed through tubes, instead of large flues. This is one of the most important changes that has been made in Western steamboat motive apparatus since its establishment upon these rivers; and it is one that cannot fail to produce good results, for, it must operate to lessen, if not banish, the disastrous consequences of collapse and explosion. As in the east, no doubt but tubular boilers will be found to give every satisfaction to the engineers under whose charge they shall be placed, when the experience of the constructors shall have perfected them in the best manner of securing the tube-ends to prevent leakage; and the best proportion of space between contiguous tubes, to secure evaporative efficiency with facility of access, for removal of scale and mud. In those noted, the tubes are about 14 ft. long, 3 in. diameter, and 1 in. apart, which is closer than usual in the practice of many eastern marine engineers, who have learned that the steam-producing quality of a tubular boiler does not depend upon the number of the tubes, but upon the proper proportion between their aggregate area and that of the grates.

When the tubes are crowded in, the excess is not only a wasteful expenditure of costly materials, but is hurtful, as the draft is made sluggish by the too great area; the water capacity of the boiler is diminished, and the upper rows of tubes are liable to become over-heated from being deprived of intimate contact with the water, the spaces being mainly occupied with the passage of the steam-bubbles formed upon the lower tubes and the

* Journal of the Franklin Institute.

shell. A preventive of the latter defect would be increasing the spaces between the tubes of the horizontal rows as they approach the surface of the water; say, for example, where the tubes are of 3 in. diameter, let the spaces of the bottom row be 1 in.; of the next row, 1 and 1-8th; next 1 and 1-4th, and so on, increasing by eighths, or any other quantity that may be determined by the number of the rows. This disposition will also afford a better chance for the insertion of the tools required to loosen the scale upon the lower tubes, and for repairs.

ON THE NATURE AND EFFECTS OF DEPOSITS IN BOILERS.

Opinion is much divided upon the nature and effects of steam boiler deposits, and the subject is one of great importance. The following is a report of an analysis made by Dr. Edwards, of Liverpool, to test the heat conducting power of such deposit.

Analysis.—Analysis of crystalline deposit from boilers; very hard; whitish brown color; crystallized in repeated layers of small prisms; inner surface, in contact with the water, rough and nodular; specific gravity, 2.82, at 60° Fahr., contains—

Sulphate of lime	78.00
Water of crystallizing action	14.00
Sulphate of magnesia	3.20
Sulphate of potassa	1.60
Silica	2.20
Organic matter and traces of chlorides	1.00
	100.00

The above analysis shows that the crystalline deposit consists chiefly of dihydrated sulphate of lime, crystallised in prisms. The other salts appear to me to be deposited between each act of crystallization, which forms a layer of the saline constituents of the water adherent to the primary crystals of the sulphate of lime, and may thus be regarded as impurity, and of secondary importance. The definite crystallization of the gypsum would doubtless operate greatly in increasing its power as a conductor of heat.

With reference to the conducting power of this deposit, I experimented with a vessel, the bottom of which was formed of the same, half an inch thick. I found the heat passed rapidly through the material, and that the highest temperature attained by the outer surface during a continued [illegible] ing was 240° Fahr. Such a temperature cannot injure th[illegible] plates, and it seems to me that this species of inc[illegible] good conductor of heat to prevent the iron bec[illegible]

J. Baker Ed[illegible]

THE STEAMSHIP VANDERBILT.

THE season having arrived for placing this huge steamer permanently upon the ocean course of the Atlantic, we have deemed it of interest to publish her lines, and the following particulars of hull and engines. The *Vanderbilt* was launched in 1856, and was constructed by J. Simonson, at Green Point, N. Y., for the owner, Commodore Vanderbilt. The work was done by the day, and in the staunchest manner. The dimensions are as follows:

Length on spar deck, 331 feet; at water-line, 328 feet; breadth of beam, at midships, (moulded,) 47 feet, six inches; depth of hold to spar deck, 32 feet 6 inches; length of engine and boiler-space, 114 feet; draught of water, with 500 tons of coal on board, 17½ feet; loaded draught, 19 feet; contents of bunkers, in tons of coal, 1200; tonnage by carpenters' measurement, 5,100; by government measure, 3,900 tons.

The frame is principally white oak, and is sided 15, and moulded 21 inches. The first and second futtocks are of white oak, and the third and fourth of live oak and locust, in nearly equal proportions. The frame is diagonally strapped with 350 iron straps, about 40 feet long, 5 inches wide, seven-eighths of an inch thick, and weighing, together, about 96 tons. The planking is of white oak, 6 inches thick, fastened with locust treenails and copper bolts. There are 5 decks, 3 extending the entire length of the vessel. She is divided into 16 water-tight compartments, by wooden bulkheads. The necessity of thus dividing the interior of steamships, and indeed, vessels of every description, is now very generally acknowledged by owners and the public; it remains, however, to bring to the knowledge of all parties the importance of building these bulk-heads of iron instead of wood. The latter material may be cheaper in the first cost, and perhaps answer the purpose of safety against flooding, but the former material, if adopted, would answer better than wood as security against the waves, while in case of fire it would be vastly superior. A fire confined to one compartment, by iron bulkheads, could be subdued with comparative ease.

The floor of this ship is filled solid with white oak, and the floors are bolted fore and aft to each other, with 1¼ inch iron bolts, from 6 to 8 feet long. The fastening through the keel is of copper, 1 3-8 inches, 2 in each timber. Weight of bolts in hull, 50 tons. The frames are spaced 32 inches apart from moulding edges.

The main deck dining-saloon is aft, and is in length, 108 feet, in width, 25, and 8 feet high. It is furnished with 20 state-rooms, with two stationary berths, and a sliding berth in each. The state-rooms are 6 feet long, 8 feet 10 inches wide, and about 8 feet high. The cabin is finished with

oak, in the oriental style. The panel-work of the state-rooms is oak veneered on pine. Nine state-rooms open on both starboard and port gangways, and 5 state-rooms are situated behind the aft pantry. The forward dining-saloon is fitted up in the same style, with the substitution of pine for oak. Belonging to it there are 45 state-rooms, and 138 berths. Farther forward is another cabin, with thirty-three berths.

The upper deck saloon is finished in elegant and substantial style, and is 258 feet long, and 30 feet wide, with 41 state-rooms and 46 berths. Five hundred passengers can be comfortably accommodated in all parts of the ship. She is furnished with 8 life-boats. The cost of the immense ship is set down at $800,000. The machinery is said to have cost $220,000.

The boilers, engines, and wheels are as follows:

Boilers, 4 in number, horizontal return tubular. Length, 28½ feet; breadth, 13 feet 11 inches; height, exclusive of steam chimney, 13½ feet; number of furnaces, 8 in each boiler; average length of grate bars, 6½ ft.; internal diameter of tubes, 3 inches; weight of each boiler, about 60 tons; diameter of smoke-pipe, 8 feet 8 inches; height of dito, 40 feet. Coal to be bituminous, and the draught natural. Engines—vertical beam variety. Two cylinders, each 90 inches in diameter; stroke of pistons, 12 feet; the cylinders weigh 19 tons each; the shaft is 25 inches diameter; paddle-wheels of wrought iron, diameter, 41 feet; length of blades, 10 feet; depth, 2 feet; number of blades, 36; there are three flanges to each wheel, weighing 7 tons each. The engine is elegantly finished, and its working may be inspected from the cabin, as on the North river steamboats. The engines were supplied by Messrs. SECOR & BRAISTED, of the *Allaire Works*, and will do credit to their engineering skill.

The performance of the *Vanderbilt* on the route between New-York and Southampton will shortly be tested; we hope she may aid the *Adriatic* in redeeming the lost laurels of this country on the route to Europe.

Since the above was written, (and which should have appeared in the preceding number, with the lines,) the *Vanderbilt* has had a trial trip, as follows:

She had in her bunkers 600 tons coal, or about one-half of the full quantity required for the Atlantic voyage, and drew 17 feet, 9 inches water. Carrying a pressure of 18 lbs. steam, cutting off [illegible] piston, her engines make 17 revolutions [illegible] the Southwest Spit to the Narrows—9 miles [illegible] ire distance up to Castle Garden—17 mi [illegible] le way against the ebb tide. Her [illegible] eta-

tions of the most sanguine. All on board were delighted with the perfect steadiness of the ship, the entire absence of jarring motion, and the extreme solidity and strength everywhere apparent. On the 5th of May she sailed for Europe.

THE RESISTANCE AND PROPULSION OF SHIPS,

WITH REFERENCE TO COMMERCIAL UTILITY.

As every movement in nature is governed by general principles, and all results are consequent upon causes having their origin in the established relations of things, it follows that every art and pursuit of man may have its science. Indeed, without science, no ends of use can be reached, except in the most imperfect manner, and with an undue amount of exertion. Science economises; hence we find mankind, whether in savage or civilized life, striving for the attainment of *perfection* in whatever art or profession their interests may be involved. A canoe may be quite as complete in its adaptations as the breathing steamship.

In whatever art, the knowledge of principles must necessarily precede their collection and application as science to the end of utilizing labor, or the motor powers, and obtaining complete results. When we attempt to apply mathematics to the solution of a problem in art, the first principles of which are yet unrevealed, or unknown to us, error and absurdity can be the only fruit. Algebraical reasoning possesses no royal charter for the solution of rules, in the absence of salient *facts*. Marine Architecture has been denied a place amongst the exact sciences, mainly because of the paucity of principles in the collection of many of its speculative votarists. The extent to which these persons have substituted *hypothesis* for fact, has been mistaken for the index to an impossible, rather than a practicable science. Those who have known least of ship-building appear to have found most leisure to dilate upon Marine Architecture. Facts and figures have seldom been united in analysis; hence the resistance and propulsion of ships, with reference to commercial utility, have gone begging for elucidators, from mathematicians to mariners, merchants and mechanics , and to no profitable results. Up to the present time there is very little more information in the "books" on this subject than in a basket of chips, notwithstanding all the algebra consumed under the crucible of hypothesis. We have clashing *formulas* adduced from assumptions, instead of harmonious rules from first principles, and thus discredit has been thrown upon the problem for investigation, which is really one of the most important for solution presented to this commercial age.

The science of modeling and propeling ships, so as to render the greatest service for the least cost, is worthy of the fostering care of merchants and ship-owners; yet we cannot perceive that, as a class, the subject has engaged their attention. We are sorry to say that some far-fetched, and less practical aims, are more likely to win their patronage. We may make this general remark, applicable to all classes of men, that benefactors of learning think less of increasing and perfecting knowledge than of dissemminating such as lies obscured in the rubbish of ancient volumes, as witness the liberal donations of wealthy men to "Libraries." It is not the press-work and binding which constitutes a *book*, but the sum of information offered through these instrumentalities. Let some of our commercial men become patrons of Marine Architecture, as well as literature, and devote a portion of wealth to resolving the elements of the perfect and profitable ship, equal to that which has been given to explore "Central Africa," or the caverns of the moon. We believe the scientific and philanthropic talent of MAURY has not accomplished more for commerce than the ingenious minds of others are capable of doing in the modeling and propulsion of ships, if engaged in like manner. Modern civilization exhibits no grander spectacle of practical beneficence than the prosecution of wind and current investigations at the National Observatory in Washington. But while winds, seas, and coasts, nay, the very bottom of the deep, are yielding up their secrets, shall those of the ship remain unknown? Were we to judge from observation of public zeal for the perfection of ship-building, we should say, it is all the same to the maritime world, whether its ships boast the paternity of a builder who has constructed his *one hundred sail*, but is still incompetent to combine the elements of a successful *launch*, or leap from the stocks of the cheapest contractor. Whether the ear-marks of improvements be borrowed or stolen is never inquired.

In the examination of our subject, the question arises, can the resistance of the water to a ship's progress be measured or computed, and if so, how? We shall defer the answer until after a review of the influences which govern the resistance of vessels enables us to comprehend the first principles of the science of Marine Architecture. In answer to a London writer, who declares "the science of Naval Architecture is without a champion [in England] that will boldly avow what *data* in the construction of a steam-ship is required for any given rate, the power being given," we may say
that we challenge him to produce [illegible] which will
realize a given speed, if the resist [illegible] l; and
in case he, or any other engine [illegible] lve the
problem. The "data" which [illegible]
. On page 70, (present volum [illegible] vessels
at sea, uninfluenced by wind [illegible] model,

displacement, and *friction*. Under the head of model, is include principal dimensions, bulk above water, draught of water, distribu buoyancy, sharpness, fullness, length, breadth, depth, flatness, sh sharpness of floor, length of run, &c., &c., according to the popu ception of those terms, and the influence of each in the developm the peculiarities of ships. By displacement is to be understood th tity and weight of water set aside for the flotation of a vessel, corr ing to the bulk of her immersed body, and precisely equal, in we the total weight of the ship. Friction comprehends the condi smoothness or roughness, the attraction of the fluid, and the immersed surface of a ship's body.

It is the *model* of vessels which furnishes so much difficulty in th ation of rules for computing resistance. Were the form of vessels to any of the elementary geometrical solids, mathematicians migh some chance for a correct solution of the problem of resistance; solid of a ship's displacement is none of these, and no two are alil avoid the difficulties presented by model, engineers very generally it in their crude calculations for propelling power, and adopt only of midship section, and in some cases the displacement. We wi that vesse'' nay be so formed as that the midship section and d ment migh properly be taken as the basis of an approximate tion for the resistance, but that vessels are so formed in general true. The midship section theory involves no consideration draught of water—whether the vessel be 40 feet wide and draught, or 10 feet wide and 40 feet draught, or 20 feet wide equal draught, is never inquired—if the *area* be the same, it is a that a ship having dimensions corresponding to either examp experience the same amount of resistance at a given speed. No a tion can be more erroneous, for resistance varies with the ang volume of the moving body, and hence deep draught cannot be sharp as light draught vessels; besides, the former will meet with i ed resistance from the greater hydrostatic pressure. Again, in case sel has a long midship body, or a straight side for a considerab tance, the midship section may be increased by adding breadth, vessel would perform the better; and if a few more degrees of ness be given to the bow, by removing the fullness, several tin quantity removed may be added to the sides, and a farther gain o result.

Some of the scientific *quidnuncs* who advocate the midship sectio ry, take no account of any other condition or dimension. Such a is preposterous. The midship section of many of our clipper ships is to that of others known as full freighting ships, and it is notorious th

former derive their qualities for speed from their superior *models* mainly. Other writers ascribe to length, as such, the most marvellous functions in attaining high speed; this, however, is only an indirect method of diminishing the midship section, as all our ideas of extension are relative. Length is a valuable element of speed when *form* gives it development; but length without form, is of dubious utility. It has limits based on its relations to displacement and midship section, which cannot to advantage be exceeded. A vessel might be built so long and slender bodied that she would not displace water enough to buoy her above the surface, and be entirely unfit for any service whatever—even for speed, not being able to carry the requisite propelling machinery. The friction of the hull would form the largest portion of resistance, perhaps, supposing her to be driven at a high velocity.

Friction forms a larger share in proportion to the total resistance of all vessels at low than high rates of speed, being about the same in a given time, whether the vessel is sailing fast or slow. Hence one cause why sharp vessels do not proportionably distinguish themselves when in company with full ones at low speeds. This element forms a greater portion of the resistance of all vessels than is generally kept in mind. It is, of course, well known that a foul bottom decreases the sailing or steaming capacity, sometimes to the extent of one half the usual speed; but vessels are seldom docked for cleaning; only when repairs are wanted below water, do bottoms of ships generally receive attention in this particular. The fairness of a ship's body, as well as its smoothness, is worthy of consideration in view of speed. For this object the lines of the body should end in the forward edge of he stem at an intersection, leaving no surface but only a sharp edge presented to the opening fluid. The same principle should be adopted aft. It is strange that the professors of naval architecture who have followed the theory of the fish's tail in giving attenuation to the rur of vessels, have not been so consistent as to terminate it in the *thinnest* possible construction, in entire imitation of their copy.

The volume of the displacement must be considered as one element in resistance, in navigating the ocean. In vessels of similar form, moving at equal rates of speed, the motion communicated to the water in advancing through it, must be proportionate to the displacements, and in direct ratio. The displacement, representing the volume of water set aside, at consecutive spaces equal to the vessel's length, as she progresses in her course, should be the standard for comparing types of model—the best being the fastest with equal propelling power. It is set down [illegible] a large displacement (or a large ship) has advantages over a small [illegible] is true, but in consequence of other influences, the chief fact [illegible] the large vessel pursues a straighter or more direct line in [illegible] is influenced

less by a given state of the sea; and having greater momentum at the same speed, loses less in velocity from irregular and inconstant application of propelling power. But it is to the distribution of displacement in the line of a vessel's length that the main elements of resistance may be referred. And here we shall expose the superficiality of writers who have been reasoning on the resistance of vessels with reference to a transverse section only. How can a section be made to represent a volume, or a surface be compared with a solid? These writers have supposed a ship's body to originate from the greatest transverse section, which, as a plane surface moving at a given velocity through the water, would experience a given amount of resistance. This resistance, they tell us, cannot be diminished by the addition of ends, for the reason that an inclined plane does not decrease the weight of the load! The premises are devoid of any claims to notice.

The origin of a ship's body may be referred to the *buoyancy* which is required for her own weight and that of her cargo; and the elementary idea of this buoyancy, which is represented by the displacement, may be described as conceiving it to exist in globular form. The cylinder, cone, and cube have no prototypes in fluids. The natural conception of magnitudes must correspond with the configuration of bodies in nature, and these are globular. The great bodies of the celestial universe are developed in accordance with this principle. The particles of the ocean are globular, and when excited by extraneous forces, they move in curvelinear lines. The displacement of vessels in the ocean may be regarded as mammoth *drops*, displaced to furnish buoyancy for the car of the sea. Provided thus with the quality of buoyancy, we proceed to develop by means of shape, the displacement for speed. To this end, the axis of the globular original is elongated, and the diameter contracted until we obtain the requisite length for the degree of speed desired. From this second conception of the displacement, it only remains to evolve the transverse sections as they may be designed to give configuration to the actual submerged body of the vessel.

The displacement of a vessel, is a solid, and must be treated as such. The problem for solution in modelling is, *to give it such form as may be most economical of propulsory power, at the particular rate of speed desired.* It is not less true that great power is partly sacrificed on a full model than that buoyancy is wasted by applying small power on a sharp model. It is to obtain the last two or three knots an hour that models are made extremely sharp, and not for the first two or three. For it must be remembered, there is an adapted speed for every degree of development given to the displacement. This adapted speed is found at the point where the resistance increases faster than in the ratio of propelling power to velocity

which obtained at medium speed. Perhaps we should have first stated that the ratio of power to speed in vessels is greater at high velocities than low, and there is a limit to the velocity of vessels beyond which the most extravagant expenditure of power will be entirely fruitless to increase it. The proofs of these propositions we cannot now devote space to produce, nor is it necessary; the unfettered mind will think for itself. The resistance is equal to the propelling power at all velocities; for action and reaction are always equal. And while English Engineers are discussing the *modus operandi* of measuring the resistance of steam vessels by the crude standard of the Indicated Horse Power of engines, we tell them we shall calculate the resistance of our models with a view to measuring by this standard, the efficiency of *steam engines*—for it is a poor rule that will not work *vice versa.* Mr. Armstrong, of London, thinks the Engineer should receive credit for the speed of steam vessels—the engines being everything and the model nothing, in his opinion. His formulas appear formed to illustrate this absurdity. It is clear that he knows nothing of models, possibly not all about engines.

(*To be continued.*)

UNITED STATES BOAT HOWITZERS.*

Form, Etc.—The several classes of United States' boat howitzers differ only in weight and dimensions; they are alike in the principle of construction, the arrangements for mounting, manœuvring, and firing.

In their design I have followed the utmost simplicity of figure, and dispensed with all external ornament.

Around the charge, the bronze is distributed in the form of a cylinder, sufficiently in front of the seat of the projectile; thence to the muzzle it is continued as a truncated cone. The breech-plate is a portion of a sphere, as shown in the sketch.

The bore is terminated by a conical chamber; several reasons might be urged for preferring it to the cylindric; but, so [illegible] as concerns these howitzers, the chief inducement was the [illegible] or rapid loading, without incurring the least chance of [illegible] when sent home by the rammer; an expecta[illegible]y, considerable practice fully realized.

The howitzer is mounted by [illegible] de.

* Boat Armament of the U. S. [illegible] S. N.

Principal Dimensions.

	24-pdr.	Medium 12-pdr.	Light 12-pdr.
	inches.	*inches.*	*inches.*
Diameter of bore	5.82	4.62	4.62
True windage	.10	.10	.10
Bore { length including chamber	58.20	55.23	44.00
Bore { in diameters	10	12	9½
Chamber, length	6.00	5.23	5.23
Length from B. R. to muzzle-face	58.20	56.23	45.24
Diameter of cylinder	11.42	9.00	8.00
Diameter of Chase	8.82	7.24	6.42
Length of Cylinder	15.00	12.00	10.00
Length of Chase	43.20	44.23	35.24
From base ring to axis of loop	23.75	24.60	18.78
Hole in loop, length	7.00	5.00	3.60
" diameter	2.50	2.03	1.50
Weight	1310 lbs.	760 lbs.	430 lbs.

The elevation is performed by a screw passing through the cascabel knob; the ordinary lever for turning it was found entirely inadmissible for convenient and rapid elevation; and, in lieu thereof, a light disc has been attached just below the thread of the screw. Its edge is coarsely milled, so as to afford a firm touch to the hands.

The lock is a plain hammer perforated at the head, so as to permit it free egress to the blast from the vent. It plays in a lug cast on the piece in the rear of the vent, and is so arranged as in no wise to interfere with the pointing of the piece.

A round tangent sight is made to move in a perforation drilled for the purpose, in the rear of the base ring.

In the first howitzers a hole was provided for reeving a breeching, as the arrangements for controlling the recoil had not passed through the ordeal of service. The results of trial here, had to be sure, given reason to believe that they were all sufficient; but by way of precaution, and to meet the possible failure of the design, provision was made for a breeching by a perforation in the cascabel immediately in the rear of the breech plate.

Subseqnent service has so fully shown the superfluity of this, that it has been omitted in the recent pieces, much to the advantage of the elevating screw which, by passing through the knob close to the breech plate, is enabled to sustain the action of the howitzer more completely.

If accident should ever disable the compression of the carriage, or the motion in a seaway render it prudent to use a breeching, it need hardly be more than hinted to a sailor that a thimble for the purpose can readily be fitted to the neck of the knob.

PROJECTILES.—The projectiles used in howitzers are shells and canister, to which it is now usual to add shrapnel.

The *canister* is composed of iron shot, weighing 0.16 lbs. each, and 1.07 inches in diameter, packed in a tin case; the interstices being filled with sawdust, the upper end closed with a wrought iron plate, the lower by a wooden block, which is also made to serve as a sabot.

The *shell* and *shrapnel* are cast to gauges differing four-hundredths of an inch from each other; the mean diameter allowing a windage of one-tenth of an inch.

They are made with a hole of one-fourth inch diameter; this is reamed out afterwards so as to receive a wooden plug, into which is placed a fuze, or reamed and tapped for the metallic fuze.

When the founder delivers the shells and shrapnel, they are first inspected and guaged, then put on a lathe in the ordnance-shop and reamed out.

Being transferred to another department of the ordnance, persons selected for the purpose strap them to sabots; if shrapnel, put in the balls, drive in the wooden plug, or screw in the metallic fuze, and attach the charge. All the details of dimensions and weight are regulated with the utmost nicety, and must not only be executed by practised and skilful hands, but, afterwards, be inspected by an experienced person.

When completed, they are stowed in pine boxes, so disposed that the sabot may rest on a ledge in the box, leaving the charge below free from any pressure.

The original arrangements thus contemplated the attachment of the charges to the sabots of the projectiles; but, in the equipment of ships, I have been directed to discontinue the practice.

Fixed ammunition certainly has the advantage of great convenience in the hurried preparation that frequently precedes boat operations, particularly at night. Indeed, the impossibility of rectifying any omission in the equipment of boats, when they have departed on expeditions, enjoins the absolute necessity of avoiding all possible separation of the several parts of their armament, and an habitual condition for instant employment.

			Shells		Shrapnel Case.	
			12-pdr.	*24-pdr.*	*12-pdr.*	*24-pdr.*
	Diameter*		4.52	5.72	4.52	5.72
	Thickness		.70	.90	.45	.55
For wooden plug	Thickness at Fuze-hole†		1.05	1.35	.75	1.10
	Fuze-hole to be reamed to the diameters ‡	Exterior	.90	.90	.90	.90
		Interior	.748	.698	.788	.785
			lbs.	lbs.	lbs.	"
	Weight		8.4	17.		

* Variations allowed to founders—.02 to +.02.

† The interior surface of the reinforce is a plar-

‡ The diameter of the cast-hole is .25 in., re
in. to one inch for the common fuze.

AMMUNITION-BOXES, POUCHES, ETC.—The shell, shrapnel, and canister are stowed in boxes of well-seasoned white pine. They are of two sizes. The box contains nine rounds, and the double box eighteen rounds. Each round is accompanied by two primers and one set of fuzes, if the wooden plug is used, in a case of water-proof paper, disposed of in the vacant spaces. The boxes are to be stowed in the stern-sheets, or most convenient place, and, though intended to be water-proof, should, nevertheless, be additionally protected by a tarpaulin.

A pouch of stout leather, in the form of a passing-box, is issued to each man, in which is to be carried one round of either kind of ammunition. It is slung over the shoulder by a strap, and inside of the cover is a set of fuzes for common shrapnel or shells, and two primers, so that any one of the crew is provided with the means of firing one round. In landing, each man has one charge in his pouch, so that, under any circumstances, the piece is supplied with sufficient ammunition for instant action. If the operation is not hurried by the emergency of being opposed at the beach, and the force disembarked is to move to some distance from the landing, one or two double boxes may be lashed under the axle of the field carriage, and each of the gun's crew carry two charged pouches, a weight (25 lbs.) not beyond the capacity of an able-bodied man.* Making, in all, 72 rounds for the howitzer. The pouches are to be replenished from the boxes, and the latter, when emptied, may be thrown aside, if rapidity of movement should become important.

THE BOARD OF LAKE UNDERWRITERS.

A grand experiment of reform in the Insurance business has been successfully conducted by the Underwriters of the Lakes. Their last meeting was held at Cleveland, Feb. 11, 1857. Captain E. P. Dorr, Chairman of the Executive Committee made the following address on the opening of the Convention.

Two years since, when most of the Insurance Companies doing business around the shores of the great lakes became alarmed at the increased inadequate proportion of marine premiums received, as compared with the losses, they proposed to meet in convention, for a general interchange of views, and a discussion of policy. I think this excellent movement originated with Mr. Weatherly, then acting as agent for the North-Western Insurance Company, in this city; certain it is that the call came from that gentleman. At that time we had a large and growing commerce—a business without form or shape—each man doing his in the

* Or pieces of stuff or boats' spars may be secured from axle to axle, upon which these pouches may be carried.

way that suited him best, and conserved his own *supposed* interests. The order and system indispensable to the prosecution of a safe and successful business were wanting. All were making haste to be rich—to get the quickest and largest returns possible from the least investment.

All this was telling badly on the Insurance business as a whole. One after another the companies were failing, until all became satisfied that something must be done to save the rest from bankruptcy. They met in convention in the city of Buffalo, because of a general conviction that they must act in concert. Concert of action was requisite to effect a general good in this regard, as it always is requisite to advance a beneficent measure, that must be preceded and prepared for by innovation and change. We did something—did all we could at that time. We met with some opposition; some companies that professed to act with us took advantage of a temporary popular feeling, and availing themselves of a superficial prejudice against our proceedings, and—*were buried with it the first year*, (applause) leaving nothing but the record of their indebtedness, (laughter,) to remind us that they had once assumed to be respectable companies.

The effect of what we had done told well for the Companies in the Association, and was a solid benefit to commerce in general.

The "Restriction Clause" adopted, limiting the loading of iron and dead weights to the tonnage of the vessel, put a stop to the "dismasting" and other casualties induced by the previous overloading with this kind of cargo. And although in some cases it worked a seeming injustice, as a whole it has proved a wholesome, judicious rule, and it has saved thousands of dollars to owners as well as underwriters. The owners of large carrying vessels may temporarily find fault with the rule, but all will yet admit its justice.

Well, Mr. President, we met again one year since at Buffalo, and at that Convention there was proposed, by Mr. Foote, one of the most important measures for the well-being of Insurance Companies, that has ever been introduced. I might go further, and venture the prediction that one more important cannot be introduced. I think it the *Saving Clause* for parties doing Marine Insurance; I mean *Uniform Clasification and Registration of Vessels*, and a uniform tariff of premiums on those classes. The originator and mover of that plan is not with us, but I would here pay him my tribute of praise. The effect of this plan is to *make a man pay for what he gets.* We show to the owner of a good vessel, and to the world, that we appreciate what he has done, and we do it in dollars and cents. This is the only way to correct the evils of business—to make these evils expensive—to make it pay to correct them.

We started on this plan of Mr. Foote's one year since only, but its effects have been magical. We challenge the history of Insurance to show the like beneficial results from any measure in so short a time. It met with a storm of opposition from owners; some companies embarked on the tide of popular feeling against the plan, thinking to enjoy the "thrift that follows fawning;" how they have succeeded, time perhaps will tell. All we know is, that we have had the best rates going, and have not made money; if they *have*, luck, and not prudence has made it.

Rapid strides have been made in the improvement of vessel-building in the two years last past, and we have done more; we have brought home to vessel [illegible] the soundness of our views, and the truth of our position. The vessel-builder [illegible] to-day on this great question, almost to a man. The incorpora[illegible] es are also with us, and shall we pause and stop *now*, wh[illegible] ll we, who went into this thing last spring with fea[illegible] now that, even in so short a time we see its glorious result [illegible] val of all good and conservative men—shall we stop here?

we have gained, we shall go much farther backward than before the reformation. The same motive that first called us together exists in all its force; we must meet it in a spirit of kindness and mutual forbearance, and reasonable concession. We have a common interest in keeping together, in opposing what might be called the national tendency to *extremes*. Let us progress in a conservative manner.

The *Mutual* principle must predominate, and there is no doubt but *stocks* will follow it. We must lay aside sectional prejudices, and that narrow selfishness that blinds us to our real good. It has been urged that our present system is too cumbrous—too much machinery; let the man that thinks so point out a system more simple. The whole business of Insurance is one of *chances;* around that business throw all the guards you can, reduce those chances as low as possible, and even then—as happened the past year—we hardly get out whole. Throw the business open again to irresponsible competition run wild for two years, and I do not believe a single company of all the noble corporations represented here would be solvent.

No, gentlemen! let us subordinate merely personal desires where they conflict with our highest good and the general welfare; repress the unworthy jealousies of competing interests, and move together for a laudable end as one man. There is employment for all; let us help one another, and in all the important questions that will arise for discussion, strive to act for the common good.

In these remarks, your Chairman has no private or pecuniary interest to serve, no ambition to gratify, and would close by repeating—

Co-operate—the saving interest of your companies is in co-operation.

The Secretary of the Association offered the following report:

The immense loss of life and property on our great lakes in 1854, when compared to former years, denotes an increase in loss in a much greater proportion than the craft and property afloat increased in number, tonnage and value; this denotes an increase of hazard, and with an increase of hazard rates of insurance must advance, and the business may finally become undesirable at any rate of premium. Lake Insurance was fast becoming a losing business, and as a great change had been made in the modeling, building, manning, equipping, loading, and navigating our lake vessels, it was reasonable to look upon this change as the main cause of this fearful increase of loss and its attendant consequences.

The ship-builder bound down by a *low contract*, with abundance of competition about him, built to *suit*, as others built, and produced a vessel of *fine* model and *appearance*, of light draught and large carrying qualities, but possessing a very small amount of *wood*, *iron*, and *oakum*, for the size of the vessel.

The ship-owner cared but little about the character of his vessel, because the underwriter covered *good* and *bad* at the same rate of premium; his ends were answered by procuring a good carrying vessel, at lowest possible cost, and covering her *full value* by insurance at low rates and few restrictions.

The shipper had his orders to "ship and insure," and obeyed the same, too often regarding the character of the vessel as of little importance.

The ship-master, involved in the same false system, must make *his* reputation by carrying *large loads*, and making *quick passages ;* and we are finally forced to note an appalling list of disasters as the general result of this really false system.

These, and other circumstances, combining to impress Lake underwriters with the absolute necessity of some concert of action, they met in General Convention in February, 1855, the result of which was the formation of this Associaion, into which all companies doing marine business on the lakes were invited. A tariff of rates on hulls and carges was adopted, also

divers restrictions in loading and navigating vessels, all of which, in practice, have worked satisfactorily. In the same connection, and promising to afford the same results, was an economical and reliable classification and registration of vessels, based on the reports of loca Inspectors, forwarded to a General Inspector at Buffalo, who was voted a salary of $2000, which was to cover all expenses.

The new trriff of rates was very generally adopted, and saved an immense amount to the underwriter; but the *economical* plan adopted for procuring a register did not work well. Local inspectors and agents took too little interest outside of their own companies, and the General Inspector, deprived of the basis for reports to the Companies forming the Association, could not furnish them reports, and the year closed without the desired register, and leaving the General Inspector in a very unpleasant position.

The second Convention met in January, 1856, the result of which was a more thorough organization, a revision of the tariff of rates, discriminating in favor of good vessels, and the employment of ten marine Inspectors located at different points on the lakes, to inspect and class vessels, according to a prescribed form, and report the same to the Secretary for revision and publication, for the benefit of its members. These Inspectors were also to look after, report, and protect all disasters in their beats. The year has closed, and we have the satisfaction of being able to state that the whole plan of last year's organization has resulted in a triumph. In the building of vessels we have secured most important improvements, and the whole commerce of the lakes has been materially benefited.

You are now in possession of a reliable Register of our lake vessels, and a list of *Approved Masters*. You have had the protecting care and watchfulness of ten *competent* and *faithful* Marine Inspectors over your risks at all points on our lake coast, which has undoubtedly saved you many losses and expenses which would otherwise have fallen upon your companies.

You now have facilities for doing business with your *eyes open*. You *went it blind* until your losses absorbed your premiums. All that is required hereafter, to place this business on a comparatively firm and reliable basis, is for the Lake Underwriters to persevere in their efforts. It is for them to correct the great evil they were the principal cause themselves of creating; and may I not say that such a reformation will prove a *public* benefaction? * *

The following important improvements were made in their regulations:—

"All vessels hereafter built, entitled to rate A 1, shall be provided with a water-tight forecastle bulkhead, from ceiling to deck, built in a staunch and reliable manner, with gates or slides to the timbers immediately under it, communicating with the deck, and so constructed that they may be easily closed in case of accident." We presume the object of this bulkhead is to keep the forecastle free of water in case of a leak originating abaft of it; should one be originated forward of it by collision, or other cause, we fear there are few vessels of sufficient strength in the line of the keel to support the strainings upon the hull that would be consequent upon a forecastle filled with water, particularly in a gale of wind. The cabin bulkhead should also be made water-tight down to ceiling. In vessels above 200 tons carrying dead weight cargoes, we advise the construction of a longitudinal bulkhead (or keelson) to extend from either the centre-board trunk to the forecastle and cabin bulkheads, and

deck down to the keelson. If made of plate iron and stiffened with angle iron on the sides, the immense amount of strength conferred upon the vessel would enable her to sail with one or more compartments filled with water with safety. We think it must be plain to a thinking man that cross-bulk-heads will give no security unless the strength of the vessel is sufficient for the contingency sought to be provided for, and which if it occurs, is calculated to put that strength to a test of additional severity. The British steamer "Birkenhead" loaded with troops, *broke off* one compartment after another, as they filled successively from one end of the ship, until she was complely broken up, and nearly all the souls on board were lost. She required a middle longitudinal bulkhead to furnish great strength, but wanting it, she broke up.

The certificates issued to approved masters are to continue in force only for the season in which they are issued, and will not be renewed unless a good reputation for seamanship is maintained.

An uniform Policy of Insurance for the Lakes was reported, but will not be adopted in practice until the season of 1858, meanwhile a copy of it has been presented to the various companies for consideration until the next meeting. A perfect form of Policy and its general adoption, is very desirable.

No vessel laden with grain in bulk, is considered in a sea-worthy condition without good and sufficient SHIFTING boards, securely fitted, to prevent shifting of the cargo, and the Companies are directed to insert a clause in their policies making it obligatory upon vessels so laden, to provide such. With longitudinal bulkheads, they would not be wanted.

In regard to establishing a "LOAD LINE," the attention of underwriters is called to the following rule or scale, which is proposed for adoption in the new form of Policy:—" vessels having six feet depth of hold, as American Custom House measurement, to have, when loaded, at least EIGHT INCHES SIDE OUT, at lowest place in the sheer, measuring from the water up even with the surface of the main deck, at the gunwale: and vessels of greater depth to increase FOUR AND ONE HALF INCHES to the heighth of side out for every additional foot over six, in depth of hold."

The *strength* of a vessel is an important element in the extent of lading; the model is scarcely less important to be considered, but we will defer our views on the " Load Line" problem till another time. The above is a very crude rule. Custom-house measurement is as undefinable as a " piece of chalk."

WINDS AND WEATHER OF THE INDIAN OCEAN.

THE MOLUCCA CHANNELS.

By the term Molucca Channels are included those seas which lie between the Eastern Coast of Asia and that of New Holland, with the Java and Soloo Seas.

Monsoons in the Molucca Channels.—In these seas two monsoons are distinguished, which seamen call the North West and the South East monsoons; some saying that the winds hang more to Northward than Westward, and more to the Southward than Eastward The first corresponds to the N. E. monsoon North of the equator, the second to the S. W. monsoon. It is known indeed, that the monsoons which prevail in these channels, are much less regular than in the open seas, and that according to the time of year, the North and West winds prevail in turn, as well as those from South and East during the other monsoon. It may be noticed generally in these seas that South of the equator, as far as 10° or 12° South latitude, the direction of the wind varies 10 or 12 points from that of the prevailing wind North of the equator at the same time; that is, if a ship North of the equator have the wind from North, another ship South of it will have it from W. N. W., and if the first ship have the wind South, the latter will have it from E. S. E. or East. But to avoid confusion arising from this, the different names of the monsoons, the old names of the N. W. and S. E. will be here preserved, according to the case in question.

In the Java Sea, like that of the Moluccas, the N. W. monsoon commences in the first part of November, and does not attain its height till December. It continues till the end of March, a time when the weather is varied by calms, light winds, squalls, rain, &c.

The S. E. monsoon commences in April, and gradually increases till May: it ends in October, when the winds become variable.

Such is the general law observed in these two seas; but what has been said on the variation of the wind, must be remembered: it sometimes draws to the Northward or Westward and sometimes Southward or Eastward. Besides this, the changes of the monsoons do not take place at regular periods. The S. E. monsoon is subject [illegible] the wind of it is not so strong as during that from N. W

Strait of Bally.—In the Strait of B[illegible] from North with much violence: in the St[illegible] nd sea breezes are found. They blow from th[illegible] from North at about two hours after noon [illegible] d by

an interval of calm. In the other Straits East of Java, a similar condition of the wind is found, and that is also very variable.

North Coast of Java.—On the North Coast of Java, from May to July, the wind is from S. E., with a return of opposite winds varying to N. E. Near the West point of the island, during the S. E. monsoon, which brings the fine season, it is from S. S. E. varying to E. S. E. In October these winds become weaker and variable.

The N. W. monsoon generally beings in October, sometimes nearly a month before or after, and ends in March, being the season of the great rains. In December westerly winds prevail. Towards the middle of February there are storms and rain.

Batavia.—At Batavia from April to November the weather is tolerably fine; rains then set in for the rest of the year.

Borneo, South Coast.—On the South coast of the island of Borneo, that is from the Pulo-Laut to the Strait of Sunda, the S. E. monsoon prevails from May to September, as it does on the West of Java. At this period, in the Indian Ocean, the S. W. monsoon prevails North of the line. From September to April the West wind blows on this coast, bringing constant rain and dirty weather. During the S. E. monsoon, the weather which is still wet, is less rainy than during the N. W. monsoon. But it may be broadly stated that in Borneo it rains eleven months of the year.

Straits of Carimba, Gaspard, and Banca.—In the Straits of Carimba, Gaspard, and Banca, when the N. E. monsoon prevails North of the equator, N. W. winds are mostly found.

North of the Bourou and Ceram, the S. E. monsoon varies from S. S. E. to S. S. W.; at Amboyna from East to S. E. In these islands the N. W. monsoon varies from W. S. W. to N. W. This last, often called the Westerly monsoon, is the season of storms in these islands, ending in April. The other monsoon the (S. E.) begins in March and lasts till November, bringing the rainy season. In the Moluccas during this monsoon violent storms are met with, and rain falls, especially over the larger island of the Archipelago. In November this monsoon ceases. However, the Northerly or N. W. monsoon does not become established for some time after; for during two months, the winds are variable as they always are in close seas, towards the end of the monsoons. From October to April, the weather is tolerably fine.

In the Moluccas, situated between 5° South and 1° North lat. the winds are very irregular, as there is a great difference between the monsoons which prevail at the same periods in the two hemispheres.

West Coast of New Guinea.—On the West coast of New Guinea are two monsoons; one from S. E. lasting from April to October; the other from N. W. beginning with the end of October and terminating towards

April. In January, near this island, the wind sometimes varies from N. N. W. to N. E. In the spring the weather is often changeable, and in March, April and May there are storms and squalls. Erom June to September, a great deal of rain falls; from October to May the weather is fine and calm, without either clouds or fogs.

Island of Celebes.—The island of Celebes, like that of Borneo, is divided by the equator into two parts, and the same phenomena are found as here described in roferring to the monsoons at Borneo and Sumatra. On its South coast the S. E. monsoon is established from May to October, and the S. W. monsoon prevails at the same time on that part of the island which is North of the equator. The S. E. monsoon lasting from May to October, on the coast of Celebes South of the equator, brings the dryest season. The N. W. monsoon replaces the S. E. towards October, and lasts till April; rain is then almost perpetual, and the wind strong.

During the two months when the sun is nearly over the island, and near the syzygies, we have always Northerly winds and rain.

On that part of the island north of the equator, the N. E. monsoon in October takes the place of the S. W.; this is the fine season.

Strait of Macassar.—In the Northern part of the Strait of Macassar, from May to October, the S. E. monsoon is found on the east coast of Borneo. The same also takes place between Celebes and Gilolo; it is succeeded by the N. W. monsoon, lasting from November to April.

In the Southern part of the Strait the wind is from the N. E. in April, May and June, and there is less of it in August and September. During October, November and December, as well as in the following months, in these latitudes fresh breezes prevail from W. S. W. to W. N. W.

Near the West coast of Celebes, from May to October, land and sea breezes are found, while on the coast opposite of Borneo the wind is steady from South.

From November to April, on the West coast of Celebes, the wind varies from W. S. W. to W. N. W.; in April, May and June it is from N. E., but light in the month of August.

It has been observed that when the S. W. wind prevails on the coast of Celebes, about six leagues off the coast, it becomes W. N. W., and N. W. on the coast of Borneo. During the S. E. monsoon (from May to October) a vessel cannot work up against it on the low coast of Borneo, on which coast light land winds are found in this season, while on the corresponding coast of Celebes, which is elevated, a fresh land wind blows at night, followed by a sea breeze during the day. In December we generally meet the alternate winds near Celebes. In August and September the wind is light; but sometimes off this coast storms S. W. occur, and long calms.

Seas of Celebes and Sooloo.—In Celebes Sea and the Sooloo Archipelago, Easterly winds, with fine weather, prevail in October, but are not regularly established till November. In May the westerly winds replace them, and in a month become established, to terminate in October; bringing with them a season made up of rain, squalls, and tempests, which take place principally in July and August. In September a heavy mist hangs about the coasts of Mindanao.

At the beginning of the westerly monsoon, the winds are light for some time, with heavy rain, during which the wind blows from an opposite direction, lasting from the eastward sometimes for above a week. Heavy storms occasionally happen until the westerly wind becomes established. During the whole of this monsoon, the weather is cloudy, rainy, and sometimes stormy. In the same season, between Mindanao and Celebes, sudden and violent storms take place from N. W., the westerly winds sometimes lasting till November

In the Sooloo Sea the east or N. E. monsoon is not a steady fresh breeze, but often variable. Near Mindanao the Northerly winds never blow fresh, and light changeable winds often displace them for several days. The same occurs at the end of January, and it is considered that the same winds prevail from the Sooloo Archipelago to Manila.

Sea of Timor.—In the Timor Sea, and also in the Arrufura Sea between the Arroo isles and the North coast of Australia, as well as in the vicinity of Torres Strait, the S. E. monsoon blows with much regularity. Towards the middle of it, from May to August, it varies from E. S. E. to S. E. and is then very strong. The Malays call this the white season. In the beginning and towards the end of the monsoon the wind is due east, and sometimes veering to E. N. E. During this monsoon, the wind is generally fresh and steady when the moon quarters, and we find calms and unsettled weather at the time of the syzygies. This fact has also been observed in the trade wind of the eastern coast of Australia.

Torres Strait.—In Torres Strait, easterly winds prevail. The westerly monsoon does not blow there steadily; and it is frequently modified by the easterly wind, which is then light and variable, and lasts several days, until it strengthens to a fresh breeze.

On that portion of the sea between Papua, or New Guinea, and Australia, during the month of January and at the beginning of the westerly monsoon, the winds are generally from N. E. to North, drawing occasionally to the Westward.

Near the N. E. coast of Australia, as far as the parallel of 14° S. latitude winds varying from N. E. to W. N. W. prevail, and further South they veer to East and E. S. E.

Between these two monsoons, there are frequently calms of long dura-

tion, and the time of the change from the S. E. to the N. W. monsoon is the period when these long calms mostly prevail. When the monsoon is about to be established, westerly winds blow for five or six days; then they cease, and are sometimes succeeded by light variable winds for a lunation. Then at the following syzygy the monsoon becomes established, with obscure rainy weather and sometimes squalls, for two or three days. The weather then clears up and a moderate breeze sets in for some time, producing clearer and finer weather than is experienced during the S. E. monsoon.

Two or three days of bad weather may be expected at the period of the syzygies, although sometimes five or six weeks of continuous fine weather may have prevailed. Near the land the weather is always more boisterous and rainy than at a certain distance out to sea; yet about the limit of the monsoon, in 15° S. latitude, rainy and squally weather is generally met with. The mean direction of the wind is nearly W. N. W., veering to N. W. and S. W. at the time of the syzygies, and sometimes at those periods even to W. S. W.—*London Naut. Mag.*

THE BOILER CONTROVERSY.

REPLY OF "JUSTICE."

Messrs. Editors:—It appears that your correspondent, "L'Clair," though facetiously confessing his asphyxiation, still retains enough of vitality both to confess also that the results we deduced *should* follow the theory advanced by us, and to doubt the truth of our assertion that these results are facts.

We shall treat the greater part of his remarks as he has treated his subject—by letting them alone. The object of our article, as distinctly stated, was to show, first, that the "vertical tubular" is, as "L'Clair" admits, the best form of boiler for all purposes; and second, that the combinations and devices of the Montgomery Patent are the best adapted to produce the best results. This, in a discussion of the nature of that into which we are thus drawn, can be done only by an exposition of these combinations and devices, and of the principles involved in their operation. And "L'Clair" must know that nature has not yet violated the uniformity of causation: if then he considers our theory incorrect, let him show in what respects, and set us right. But if he doubts our ability to judge of what we see, and wishes us to post him in the history of the practical [illegible] is boiler, we must remind him that an arrogant dema[illegible] [illegible] point does not constitute a refutation of that which

But, Messrs. Editors, another champion entering the lists in this "free fight," has attacked us with missiles not explosive, but having all the solidity of soap-bubbles. "Seneca" has, in the first place, perhaps, misunderstood the drift of our article—and assumes as the basis of his, our having opened a tournament, the victory in which was to decide the relative merits of the Martin and the Montgomery boilers. But there is not in that article one word or sentence which insinuates "L'Clair's" supposed approval of the Martin form; neither were we particularly severe upon the latter, having said no more against it than against those of the Collins' steamers, of those of Dr. Nott, or of the Earl of Dundonald. Having, however, not the slightest objection to Seneca's picking up an imaginary gauntlet, we shall try, first, to heal in succession the seeming wounds of his sword, and then to prove our buckler impenetrable. Let us, then, examine in order his strictures on our remarks.

We are first told that the boilers of the *Fulton* are of Martin's Patent, and that their *only* fault is a deficiency of draught. We do not know what constitutes a fault, in this writer's estimation; but aside from the great size, weight, consumption of fuel, and first cost of these boilers, we would ask, in view of the fact that beside the constant and costly repairs they required while running, new furnaces have just been put in, and an entire third of the tubes renewed, what, in the name of money, would have been the result of a *good* draught?

"Seneca" next takes us to task for applying the term "ludicrous" to "*any* form of boiler which has inspired sufficient confidence to be placed in an ocean steamer." This is doubly ambiguous—we suppose that he would have all stand in awe and admiration of the doings in our Navy. But there are those in whose minds exist serious misgivings as to whether the confidence might not be *mis*placed in either the boilers or the vessel, and both the former in the latter. We think ourselves justified in here using the Hibernianism that there are two powerful weaknesses in human nature—one, a jealous disposition of those in power to hinder the progress of others; and another, a tendency to laugh at what is ridiculous. In yielding to the former, our Navy has furnished abundant material for the exercise of the latter, and has thus, in more ways than one, been the means of promoting good digestion, but very bad engineering; for which result of the second, it would deserve the thanks of our inventors, had not those of the first rendered it practically useless to them.

"Seneca" has our sincere thanks for so kindly posting us in regard to the dimensions of the Martin boilers, as compared with others. But he will excuse us for being involuntarily reminded of that unfortunate individual who, having climbed with burglarious intent into the window of a store, did, on his exit thence, become entangled by a projecting spike,

which had aided his ascent, and was ignominiously suspended on his own *hook*.

We would here state, in terms so explicit that even this writer can neither misunderstand nor misrepresent our meaning, that we neither did nor do convey the idea that the Martin boilers are, in all or any respects, inferior to all others, nor even to all other forms of vertical tubular boilers. But we do say, that by the misapplication of the heat, the efficiency of the surface is so far reduced that there is not in existence one of them that cannot be exceeded in the quantity of steam generated, by a boiler of half the size and weight, and of proportionately less cost;—that for the same reason, this greater result can be produced with one-third less coal—and that at the same time the repairs can be reduced to one-fifth of those required by the pets of our poster. In view, then, of the weight of boilers and fuel which *are necessary*, not which *were customary*, we could not repress a smile at the adoption, in our Navy, of boilers so decidedly marine as to require an ocean inside.

"Seneca's" admission that the results of our reasoning on the rate of combustion are true of boilers already built, is sufficient: as he will bear in mind that in ringing changes on one of the elements affecting a result, all the others are supposed to remain the same.

Your correspondent has volunteered the remark, more forcible than pertinent, that "no man can write sense when he is writing about a subject of which he knows little or nothing." This he has clearly illustrated in a lucubration on scale. He tells us that incrustations will "form as rapidly on a surface where there is rapid motion as where it is at rest, provided the water contained the same amount of foreign matter in each case." Now the foreign matter is either soluble or otherwise: if the latter, any one who has seen a mud-puddle in a thunder-storm must also see that the tendency to the formation of a deposit will be overcome by friction, and lessened by motion. If solubles, crystals, more or less perfect in form, will be deposited, whenever, wherever, and however the solution reaches a certain density: which crystals will then be as obedient to mechanical laws as any other foreign matter. A moment's reflection will show that the most abundant deposit will occur where the evaporation is most rapid: and that, in the case under consideration, the evaporation will be so rapid in the tubes as to cause a deposit of imperfect crystals, mixed with insoluble matter, before the solution, thus concentrated at the surface of the tubes, can mingle with the great body of the water. But in the Martin boiler, and in those of the Collins steamers, the same heat, rarifying the water in the tubes more than in the other part of the boiler, will cause a circulation of the water, sufficient to prevent, to a great extent, the formation of scale, except in those tubes where there is so

much steam as to partially isolate the metal; and as this effect will vary with the difference of the specific gravity of the water in and that out of the tubes, the latter will, in this respect, be superior to the former. In the Montgomery boiler, this effect will be greater than in either, owing to the concentration of the heat in the upper ends of the tubes. It may not be amiss to add that years of trial on sea and land have proved by the results, the truth of this reasoning, "Seneca" to the contrary notwithstanding.

Your correspondent has next gone into an elaborately useless detail of statistics in regard to the boilers of the *Mississippi*—useless, at least, unless as giving an accurate idea of the estimate placed by the Navy on old iron; for, as above stated, half this weight is superfluous. For that matter, the boilers of the Egyptian yacht contain more surface, and will make more steam, with less coal, than these samples of naval engineering. All these details may be as true as that two and two are four—but they are just as applicable as that axiom to the subject in hand: to which they have the same relation as that of a fog to an astronomical observation.

The question which "Seneca" proposed to discuss, had reference to the relative merits of the Martin and Montgomery boilers; and a bare *reference* to this question, is all that can be found in his argument; which he has built up on a comparison of an example of each form. On a foundation so insufficient and insecure, it is not surprising that he has reared a tottering superstructure.

He has taken great pains to show us *precisely* how much more water will be in contact with the upper ends of the tubes in one form than in the other; having *assumed* that the *circulation* will be the same in both, and that the steam from the crown sheets will go just when he wishes to have it, and from his assumed premises, he draws an *accurate* conclusion,—which if any one doubts, the figures, which cannot lie, are still to be seen.

He tells us that the tubes of the Martin boiler can be conveniently cleaned and replaced, and that those of the "Montgomery type" cannot be: why? Because in this example they cannot be withdrawn within the shell! Where is the necessity? He sapiently asks "what *will* you do when they are all plugged?" In view of the fiery ordeal of years of service on sea and land, let us ask, when will that be? Experience thus invoked, tells us that the tubes are the most durable part of the boiler. Again, will no arrangement of the Montgomery boiler allow of the withdrawal of a tube, or of as convenient access as any of the Martin form?

"Seneca" also seizes on the fact that the boilers of the Egyptian yacht, (of which the tubes are two feet longer than those of his examples,) stand thirteen feet high, and yet the tubes cannot be withdrawn. Admit it—let

it be thirty feet—*and what of it?* Cannot the same clay that forms a chimney two hundred feet high for a furnace, be made into one forty feet high for a house,? Every thing has its appropriate place—and that which is exactly suited to a pleasure yacht, is not good for a war ship.

L'Clair also, in the same view, tells us that the furnaces are here under the tubes, as in the Martin form—but does not choose to see that the difficulties complained of as resulting from that position in *that* form, are obviated in *this*, by the deflector also under the tubes.

But whatever may be the conclusions drawn from this comparison, they have no bearing either on the positions held by us in our first article, or on those which "Seneca" seeks to establish. The peculiarities of the Montgomery boiler have already been fully described. That of the Martin form, is the position of the furnace under the tubes, with water alone between the latter and the crown sheets. It was then the part of "Seneca" to show that some advantage results from this arrangement. This he has not even attempted to do—and he certainly displays commendable discretion : for even had not the last tinge of novelty faded from this form years ago, it is evident that as in other respects it lacks only the diaphragm to make it identical with the form he approves, the only gain is a substitution of height for length; and we could not expect "Seneca" to make this fact very prominent, in connection with the use of this form in the Navy. The offsets to this gain, in the facts that the sediment will now be dropped on the tops of the furnaces, and that the durability of the tubes is *slightly* diminished, have however driven him to the concoction of erroneous hypotheses to show that these disagreeable truths are false : but he does not refer to the boilers of the Fulton to show the agreement of practice with *his* theory.

Inasmuch then as there is confessedly no new device, no new mode of operation introduced by this modification in form, and as the results of those already combined tend in this arrangement only to increase the weight, cost, consumption of fuel, and repairs, unless this tendency is counteracted by the addition of the collecting and deflecting sheet shown in the boilers of the Egyptian steamer, we challenge the ingenuity of man to make a worse combination of better elements than is to be found in the Martin boilers of our Navy.

Having thus gone to what ought to have been the unnecessary trouble of following "Seneca," in the hopes of having the report of his weapon, we would remind him that custom hardly upholds him, having stationed us at one milestone, in then posting off to the next as his position in the combat. Returning him then our heartfelt thanks for his advice on *consistency*, we beg him to show, if by an argument

"That resembles true's
As a brickbat resemble

that our "voluntary attacks" were made on any thing worthy or capable of defense.

And as to "L'Clair," who occupies the third corner of this "triangular duel," we would suggest that the perpetration of such suicidal effusions as his last, when translated into the King's English, give evidence only of a bad head, a worse heart, a perverse nature, and a perverted education.

JUSTICE.

MAY 7th, 1857.

MESSRS. EDITORS:—You will doubtless be interested to hear from the *Mississippi's* boilers, so I send you a line. Steam is now on, and if there has been any boilers built which do not draw, the *Mississippi's* do not belong to a class of such description. I am happy to say that the draught is equal, if not superior to what it was in the old boilers—no better could be desired. The engines work beautifully so far, and without leaks. I wish you were present to observe for yourselves. The engines have worked no water as yet, and do not appear inclined to—the public may rest easy upon the future success of the old *Mississippi*.

Yours, &c., AN OBSERVER.

ERRATA.—In *May* number page 113, 14th line from top, please read—1713 cubic feet, for "1300 cubic feet." This correction is very material. Our engineering friends will please observe.

THE "RED SEA" GREEN.—The general opinion respecting the color of this sea has been that it was of a red hue, but like many other popular notions, this has been a popular fallacy. Horatius Bonar, D.D., in his work on the Holy Land, says:—

"Blue I have called the sea, yet not strictly so, save in the far distance. It is neither a red nor a blue sea, but emphatically green—yes, green of the most brilliant kind I ever saw. This is produced by the immense tracts of shallow water, with yellow sand beneath, which always gives this green to the sea, even in the absence of verdure on the shore or sea-weeds beneath. The blue of the sky and the yellow of the sands meeting and intermingling in the water forms the green of the sea, the water being the medium in which the mixing or fusing of the colors takes place."

THE OCEAN TELEGRAPH.

BY J. M. BROOKE, LIEUT. U. S. N.

There are some who doubt the possibility of laying a telegraph cable across the Atlantic. I think it may be easily shown, however, that the eventual accomplishment of the project is much within the limits of probability. It is true that we have but little experience in this kind of engineering; yet in kindred branches, there have been many interesting facts developed bearing directly upon this subject. We know, for instance, that not unfrequently four or five miles of small twine, less than one-tenth of an inch in diameter, have been veered into and dragged by heavy weights to the bottom of the sea, and that in seme instances these lines have been recovered from a depth of nearly four miles.

Suppose that, without attaching weights, you were to pay this twine freely out, and to run on with the ship: you might go from New York to Ireland, and if the line were slack enough to meet the demands of diverse currents, it would be unbroken. This twine would require no regulating machinery, but it would scarcely sink to the bottom.

Now in some experiments in the Gulf Stream, under the direction of Lieut. Walsh, six miles of steel wire were veered out, and much of it was recovered before breaking. You might then, but for its too rapid descent, span the ocean with a wire; it would reach bottom quickly, but would require the most minute attention, and various appliances, to regulate its velocity and to guard against waste. So that, what we require, is to combine, as it were, the strength of iron with the lightness of twine; to construct a cable that may be strewn upon the water, to find its way slowly to the bottom while the ship runs at her highest rate of speed. Thus the greatest resistance to the descent of the cable may be obtained, and the tendency to slide away diminished. This most favorable of all conditions is only limited by the probable strain arising from the action of unequal currents.

Gutta percha, the insulating material, affords a ready means of diminishing the specific gravity of wire cable. It is true that in adding gutta percha, the surface exposed to the action of these currents will be increased; but there is evidence of their *abscence* at the depth of a thousand fathoms: this we learn by miscroscopic examination of specimens obtained from the bottom of the sea. But apart from this, there is a compensation afforded by the movement of the cable itself—it will sink in the direction of its inclination; in other words, it will run away from the ship in opposition to her course, and this retreating of the cable, may be term "*back-set.*" It is evident that while this action tends to *waste* the c

[illegible] more than supply the demand of the market. The [illegible] which [illegible] presents the most serious [illegible] with a [illegible] It is the opinion of several [illegible] men [illegible] copper wire [illegible] with gutta percha [illegible] But there are certain contingencies—liability to [illegible] from the rolling of the ship and its [illegible]: it would even be [illegible] by the keel of a boat; a hungry shark would [illegible]; therefore, it is necessary to protect the gutta percha.

The cable of the Atlantic Telegraph Company is composed of seven copper conducting wires coated with gutta percha, forming a core which supports in spiral coil some seventeen twisted strands of iron wire, each composed of several small wires.

It remains to be seen, in practice, whether these various materials have been most advantageously combined.

Suppose that the copper and iron wires were straight and parallel: in that case, since the relative ductility of these metals is about as four to five, in favor of the copper, the iron wires would practically bear the strain, relieving the copper; and this, without regard to change of form in the core of gutta percha. But in the cable, now in process of manufacture, the outer wires will make two whole turns to the foot. It becomes, then, a serious question, whether by strain, or the pressure of five or six thousand pounds to the square inch, the core will be compressed or altered in form. The water penetrating between the iron wires will surround each part of the cable, and on them, individually, exert its powers of compression; if the gutta percha yields, the iron wires will become loose—will extend—and the strain will come on the straight copper, *drawing it;* and although it may yield 20 per cent. of its length, without breaking, any such process involves risk.

It is stated that *India-rubber* is less compressible than water, and it may be inferred that gutta-percha resembles it in that respect, as well as in some others. But this comparative incompressibility of India-rubbber is only observed when that substance is entirely immersed; but parts of the cable will be above water, and as gutta percha is of nearly the same specific gravity as water, its longitudinal extension, granting it incompressible, will chiefly be restrained by adherence to the copper wires; the outer spiral wires will in some degree elongate with the gutta percha.

In its perfect form, this cable possesses flexibility, lightness, and great strength; *it might be lighter with advantage.* To say that a cable will support six or seven miles of its length, when suspended in still water, conveys but a very general notion of its adaptabillty; for a rope, of specific gravity nearly that of water, would support many more miles of its length when so suspended. We must take into consideration the fact that the

cable is, to a certain extent, to be dragged laterally through the water the resistance from this source will exhibit itself in the sliding astern, or *back-set* before alluded to.

It is this tendency of the cable to run in the direction of inclination, which will render the operation of laying it difficult. Perhaps it will be necessary to arrange the regulating machinery so as to indicate constantly the strain upon the cable, and then to veer no more than safety demands.

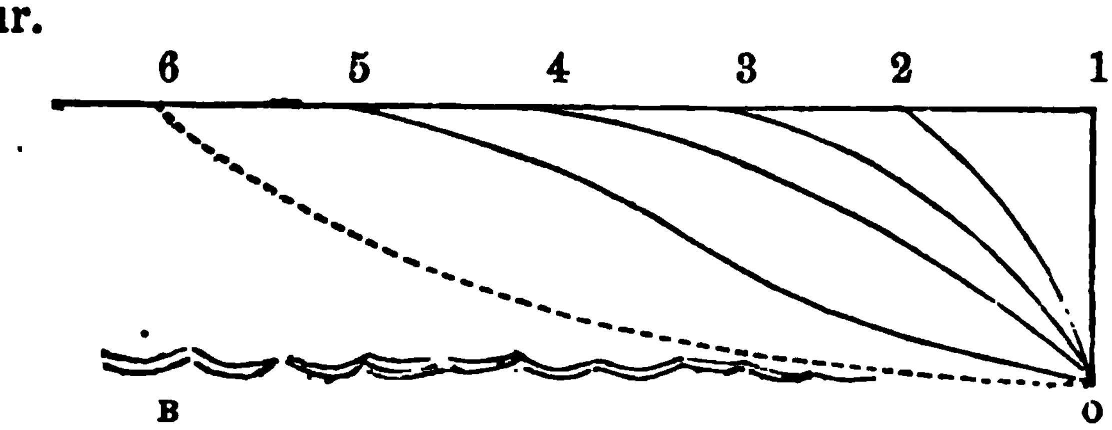
It has been observed, in *deep sea sounding*, that the lines have a tendency to twist, probably in part due to spiral character of surface; it is usual, therefore, to attach swivels to them; the conducting wire does not admit of such an appliace. The smooth and unbroken spirals of the wire cable affording an easy passage to the water, it is to be anticipated that as mile after mile of this cable goes down, it will twist—the turns will follow the ship, and accumulate. But this prejudicial result may be modified by coiling the cable on board, with reference to the resulting turns; and this application, which does not appear to have been recognised, makes useful disposition of these *coil turns*, rendering it unnecessary to complicate the arrangemment of the cable on board by attempts to avoid or destroy them.

The character of the curve assumed by the cable on its way to the bottom will depend upon the velocity of its descent, and the speed of the ship.

If the cable, when extended horizontally upon the water, sinks faster than the ship runs, the convexity of its curve will be towards the bottom; the upper portion, nearly vertical, will descend more directly, and therefore more rapidly, towards the bottom; the lower portion will consequently *be deposited in waves upon the bottom.*

But let us suppose that we have a cable which, when laid horizontally upon the water, will descend less rapidly than the ship advances.

That we suspend this cable vertically from the vessel, at pos. 1, (see diagram,) its lower portion fixed on the bottom at 0; and that, then checking the cable, to prevent waste, the ship moves off at perhaps the rate of 10 miles an hour.



It is obvious that as her dragging force is applied at right angles to the vertically suspended cable, the resistance of the water will cause it to assume a curve, (0 2,) its concavity towards the bottom. Now as the vessel

runs on from position 2 to 3 and 4, constantly checking the cable to prevent its running right down, the angle will become less and less, until the dragging force of the ship will be exerted nearly in the line of the cable itself, (0 4)—Then the gravity of the cable coming into play, carries it b. this line, so that its *convexity* is towards the bottom, (0 5.) But the upper portion of the cable, which is being continually paid out from the ship, sinking with a lower velocity than the ship's rate, will still present its concavity towards the bottom, (0 5.)—There will be a *wave* in the cable, and this wave will exist, whether we start as supposed, with acable suspended vertically, or simply inclined—so long as it is checked on board the ship. And this checking cannot be dispensed with, except in the case of a cable much lighter than that of the Atlantic Company.

This wave would, under certain conditions, cause the exhibition of singular variations in intensity of the strain upon the cable.

If, for instance, the speed of the ship be reduced, more or less suddenly, to less than the sinking velocity of the cable, the wave will travel towards the ship—and the strain will be reduced in an extraordinary degree; but a moment after, the cable, assuming the catenary 0 6, will exert a tremendous power. It would *then* be necessary to increase the speed of the vessel, without attempting to arrest the cable, until a considerable portion had been laid more horizontally upon the water, and the wave thus re-established. When we consider the great velocity of such a *running-out*, we may fear fatal accident, as well as waste. And we are impressed with the importance of attaching an indicator of intensity of strain to the regulating machinery. This may be accomplished by the employment of elliptical springs, so applied as to receive from the axle of the drum, or drums, the strain of the cable.

Two such springs, furnished with graduated scales of compression, and applied, one to each end of the axle or axles, would, if the cable were limited to an intermediate space on the drum between them, show, by the sum of their indications, the strain of the cable, excepting that small portion applied in opposition, to prevent the cable from *rendering* around the drums.

As in using drums the protecting wire sometimes cuts through the gutta percha, it would perhaps be proper to *score* the drums in such a manner, that along the line of bearing, the convex surface of the cable, lying in a close-fitting groove, would be generally supported; the power to *cut* would not then be concentrated in any single wire, but would be divided among them all.

It seems preferable, in constructing a telegraph-cable, to arrange the strengthening and protecting wires straight, and nearly parallel to the copper coducting wire, the latter slightly sinuous; and to cover the whole

with an external coating of gutta percha, or other similar material, which would bind them together, and prevent their cutting the insulating core, which, as before remarked, sometimes happens with heavy cables.

The present cable may not be successfully laid, but the eventual accomplishment of this great enterprise can scarcely be doubted.

TRIAL TRIP OF THE FRIGATE NIAGARA.

We have assurances from the best authority that the following report of the *Niagara's* performance is substantially correct. It is taken from the New-York *Daily Times.*

The frigate *Niagara* started upon her trial-trip on Wednesday, P.M., 22d of April, having on board, in addition to her officers and crew, Mr. Martin, the Engineer-in-Chief of the U. S. Navy; Mr. Murphy, a partner of the Fulton Iron Works Co., the constructor of her engine; and the reporter of the *Times.* The anchor was weighed at 4 15 P.M., opposite to Bedlow's Island, and we steamed down the bay without sail, against a strong flood tide. The frigate turned the south-west spit in a space of twice her length, showing a quick attention to her helm. In one hour and forty-five minutes she passed the point of Sandy-hook, and at 6.20 P.M. was outside the buoys, being just 2 hours and 5 minutes from her anchorage —distance, 20 miles. The engine performing from 36 to 38 revolutions, working without noise or jar, and indicating a successful run.

During the night, the engine continued to perform well, there being a heavy head swell. The Engineer-in-Chief having given orders not to crowd the engines, and limiting the amount of coal for the night, only 31 to 32 revolutions per minute were made, but the ship made from 7 to 7.5 knots an hour. During the night, only *one ton* of coal per hour was consumed, and all the furnace doors were kept open. 23d, at 9 A.M., engine making 30 revolutions, speed, 7.4 knots; at 9½ A.M., the order to put sail on the ship was given, there being a light breeze from the S.W. At 10 o'clock, all sail was set, and also going under steam, engine making 36 revolutions. Ship going off finely, 11 knots by the log, and as steady as a die. 11 A.M., speed by the log, 12 knots, when the mainsail and fore and main staysail were set; engine making 38 revolutions; the wind light, from W. S. W., and weather pleasant. At 12 M., the lat. (by observation) was 38° 50′, lon. 71° 55′; ship going 12 knots, with 34 revolutions of the engines. At 12½ P.M., set fore topmast and fore and main top-gallant studding-sails, ship kept off S.E., speed, 12 knots, revolutions 34. At 2.45

P.M., hauled the ship on a wind, when, as the braces were hauled taut, and the sails were filled, carried away the mizzen top-gallant mast, and royal mast (one stick.) Took in the light sails. Engine, 34 revolutions, and speed of the ship, 13 knots. Engines giving entire satisfaction, and the ship performing admirably in every respect.

The performance of the ship and engines were like the foregoing, up to 8 P.M., when the sails were furled, ship headed N.W., the yards pointed to the wind, and continued to steam through the night. A fresh breeze blowing from N.W.

24th.—The ship has made 7 knots through the night, with a strong head-wind, with only 32¼ revolutions, and steam, 15 pounds. The last 5 hours of the trip, the engine was driven as high as 45 revolutions, and the ship logged an average of 10½ knots. At 3 P.M., made the highlands of Neversink, and at 7 P.M., stopped the engine, to put passengers on board a tug for New-York.

The combustion of coal is entirely utilized in the generation of steam. No smoke or flame issues from her smoke-pipes, which, throughout the entire trip, have been perfectly cool. From careful examination of indicator diagrams, the evaporation is found to be 9½ pounds of water to one pound of coal. The engines were not slowed or stopped during the trip, and not a bolt or screw was started throughout. The chief difficulty of propellor engines, caused by the speed of the shaft—hot journals—was escaped entirely; in a word, the Chief Engineer expressed entire satisfaction with the working of the engines. The Engineer-in-Chief of the government has written to the Secretary of the Navy, expressing entire approval of the engines, and of the manner in which the contractors, Pease & Murphy, have fulfilled the contract.

The *Niagara*, as a sailing-ship, fulfilled the highest expectations of Capt. Hudson and his officers. She is perfectly easy in a sea-way, and steers like a pilot-boat. She makes no impression upon the water for 40 feet from her stem, where there is the slightest ripple, and breaks the water in the wake of the fore-chains. She leaves a perfectly smooth wake behind her.

The above report is from the observations on deck. The following abstract is from the engine-room, below. It may not be entirely accurate, on account of the haste with which it was prepared, but is sufficiently so for present information. We may look for a better report on her arrival in England The *Niagara*, so far as this trial proves, is about one knot faster, under "*auxiliary*" steam power alone, than the other ne[illegible] She will do better than this yet. The screw showed too mu[illegible] is one of Griffiths' English patent.

NIAGARA'S TRIAL TRIP.

Reported Steam at 1 30, *got under way at* 4 *P.M.*, *Apl.* 22, 1857.

Watches.	Time. hrs.	Rev. per min.	Press. of Steam.	Av. knots per hour.	Pds. coal cons'd per hour.
3 to 6	3	35.8	19.6	8	3.180
6 to 9	3	34.8	18.3	8	3,180
9 to midnight	3	29.4	15.6	8	1,920
23d, midnight to 4	4	30.15	15.3	8	2,100
4 to 8	4	29.6	14	8	2,940
8 to M	4	34.37	15	9	3.120
M to 4	4	33.05	11.7	10	3 360
4 to 8	4	35.2	15.2	11	3,120
8 to midnight	4	33.3	16.7	8	3,360
24th, midnight to 4	4	31.17	12.7	7	3,360
4 to 8	4	32 9	14	8	3,360
8 to M	4	43.8	15.5	10	3,600
M to 4	4	45.6	15.5	10.5	4,980

REMARKS:—22d.—From 3 o'clock to midnight, no sail set; strong current, and heavy head-sea against the ship; engines perform well.

23d.—From midnight to 10 o'clock, A.M., under steam alone; engines working well. 10 A.M., all sail set. 2.45 took in studding-sails; 3 P.M., carried away mizzen top-gallant mast; 8 P.M., took in all sail.

24th.—Midnight to 4 A.M.. strong head-wind, and moderate sea; from 4 to Meridian, light head-wind, smooth sea; engines working well. Sent down royal yards; at 7 o'clock, stopped the engine east of the light-ship.

BOSTON BOARD OF TRADE.

REPORTS PRESENTED ON THE 21ST OF JANUARY, 1857, BY ISAAC C. BATES, SECRETARY.

WE are in receipt of this most interesting volume, and are highly gratified with its perusal. Its importance as a work of reference for merchants, mechanics, and manufacturers, is very great, as may readily be seen from the following prospectus of the talented Secretary:

"It is proposed to publish regularly, in the annual Reports of the Board of Trade, an account of the doings of the government of the Board during the previous year, together with such reports and statistics of the trade and commerce of the city, and other matters connected therewith, as may be [illegible]ned advisable.

[illegible] is also proposed to give an account, from time to time, of the mon[illegible] [illegible]its and measures, customs tariffs, and commercial regulations of

the principal countries of the world, arranged in a systematic form, which may be readily referred to, and will render the notice of subsequent changes easy and intelligible."

The Boston Board of Trade is pre-eminently distinguished for its enterprise and vigilance in promoting the interests of the city of Boston, and in acting upon questions of public moment. We take pleasure in commending its example to other cities of the Union.

NATIONAL QUARANTINE CONVENTION.

THE National Convention of Representatives from the local Boards of Health and Medical Societies of the principal seaport cities throughout the Union assembled in Philadelphia, May 13th, in the Supreme Court Room, State House building. The session lasted for two days, and the questions before the Convention were most ably and thoroughly discussed. The opinions of this Convention upon the subject of quarantine regulations are embodied in a Report, which was considered, amended and adopted, section by section, as follows :—

A. Disease may be introduced: 1st. By a foul vessel, especially when proper measures are not taken to keep the hold free from stagnant and putrid bilge water; and more particularly when there exists in the hold washings or drainings from sugar or molasses, or when coffee, grain, or other putrefiable matters are allowed to penetrate and remain beneath the timbers of the ship. 2d. By cargoes consisting in whole or in part of rags, cotton, or other light, porous substances, shipped from ports at which any malignant epidemic or disease of an infectious and contagious character prevailed at the time when the vessel was loaded. 3d. By the filthy bedding, baggage and clothing of emigrant passengers, particularly when these are crowded together in insufficient quarters, although the passengers themselves may be free from any actual disease. 4th. By the air that has been confined during the voyage in closely-sealed and ill-ventilated holds. 5th. By squalid and diseased passengers landed and crowded together in unhealty neighborhoods, or in small and ill-ventilated dwellings. 6th. By passengers and crews, who are actually laboring under or infected with any positively contagious disease, from their bedding, clothing and baggage.

B. 1. To prevent, therefore, the introduction of disease from the several causes enumerated, the necessity of providing a system by which all parts of the vessels may be ventilated during the voyage, and for the careful inspection of all vessels immediately upon their arrival, and before they are allowed to come up to the wharves of a city, for the landing of their passengers and discharge of their cargoes, is apparent. No infected vessel should, in fact, be allowed to do so until her hold is freely and fully ventilated by the opening of the hatches and the introduction of wind sails, nor until the bilge water is entirely removed, and the run effectually cleansed and purified. 2. Provision should be made for the immediate landing of all those portions of the cargo, baggage and clothing of a vessel judged capable of generating or communicating disease, and for their proper

such places and under such regulations as shall preclude all danger of their exerting a morbific influence, either immediately, or upon their subsequent admission into the city. 3. Provision should also be made for the immediate landing of all such persons from on board of vessels as they arrive, and their due and comfortable accommodation and treatment, until such time as they can be taken charge of, and properly cared for by their friends. 4. In the case of a ship-load of squalid passengers, or those strongly predisposed to disease, their clothing, beds and other effects should be at once subjected to a thorough ventilation and purification; and upon their landing, adequate measures should be adopted to prevent them from crowding together in confined, unhealthy and illy-ventilated dwellings and localities. 5. When a vessel arrives in a particularly foul condition, or on board of which disease has prevailed during the voyage, after her crew and passengers have been removed from on board of her, she should be subjected to a thorough process of cleansing and purification, for which purpose it may be necessary to discharge her cargo at a safe distance from the city, and to allow only such portions of it to be conveyed there as are incapable of creating disease, the residue being subject to ventilation in such a manner as shall prevent it from suffering damage and all unavoidable deterioration.

C. 1. The carrying out of these provisions should be entrusted to a single officer, with such assistants as may be required to facilitate him in the execution of his functions 2. This officer should be a regular physician, of unquestionable talents and experience, and possessed of great decision and rectitude of character. 3. His compensation should be sufficiently ample to enable him to devote his entire attention and energies, throughout the year, to the duties of his office. 4. While the power of removing him for incompetency, neglect, or other adequate cause, should be vested in some competent tribunal, his appointment should be based solely upon his capacity to fulfil satisfactorily his incumbent duties and his continuance in office made dependent upon his faithful and skillful discharge of those duties. 5. To this officer should be entrusted the sole and entire decision, under certain general provisions established by law, as to the treatment required in the case of each vessel that shall arrive, and of its cargo, crew and passengers, and to place it and these in a condition to prevent any danger of the introduction by them of disease, he, at the same time, being held to a strict accountability for the manner in which the discretionary power thus confided to him is executed. 6. As in every community a board of health is necessary to watch over its sanatary condition, and to prevent or remove all domestic sources of disease, this body would appear to be one in which the power of appointing, and the general supervision of the official conduct of the quarantine physician may, with the greatest propriety, be invested

We trust that future legislation upon quarantine regulations will be based upon the above Report. Should all our seaboard States take immediate action upon this subject, it is hoped that an uniform system of quarantine will be established, which will be utilitarian, and do honor to the intelligence of the age.

How to Measure the Distance of Vessels from Land.—A number of wrecks contin-
...ly occur from a mistaken estimate of a vessel's distance from a light or a headland. Sev-
...es of this kind have occurred within the last few months, and, in consequence
...ing suggestions for the consideration of ship-masters and ship-owners, ema-
...undell, the secretary of the Liverpool Compass Committee, have been

posted in the Underwriters' Rooms: By cross-bearings the distance can be determined very approximately, were ships supplied with proper Azimuth compasses, but on board the majority of ships this instrument is unknown; and the steering compasses, by being placed below the bulwarks or in a confined position, are quite inapplicable for taking bearings with a moderate degree of correctness. But a more exact mode than that usually adopted for cross-bearings has been suggested, and it has the further advantage of requiring much less time in execution. We allude to the use of the pelorous or dumb-card, invented by Lieut. Friend, or any similar instrument. Two of these instruments are required for the operation, and they are to be used thus: one being placed in the bow of the ship and the other in the stern, the sight vanes are adjusted to zero, and with each other. At a given instant the vanes of each are then directed to the distant object, and the respective angles read off. Having thus obtained a base line, and the two angles of the base, the other sides, or the distance of the ship, is obviously a very simple calculation; or by the aid of a simple table, which could easily be constructed by making the length of the ship the unit of measure, the distance could be at once seen by inspection, and with an accuracy, even in rough weather, that the ordinary compass observation could not pretend to in smooth water, while, like the compasses, it could be used night or day. Though these instruments are of trifling cost, compared with the value of the interests concerned, they are comparatively dear, from the smallness of the demand. Were their use to become general, a pair of these instruments, it is thought, could be sold for £5.

REMARKS ON THE PRESENT SYSTEM OF FEEDING AND BLOWING OFF MARINE BOILERS.

ITS DEFECTS, AND A PROPOSED REMEDY.

With reference to marine boilers, I would remark that in their construction and management, as applied to ocean steamers, they are still the greatest difficulty we have to contend with, and merit the best attention of the practical engineer. I venture, therefore, to submit some remarks on the management of marine boilers, as from many years' experience I am led to believe that the present system is in many respects defective; but these difficulties might be soon overcome if every competent engineer set himself to the task, and forwarded to *The Artizan** the result of his experience and observation on such matters; but unfortunately in too many cases in sea-going steamers, where practical and reliable information can only be obtained, there is not always "the right man in the right place" to give it.

It is well ascertained that in marine boilers the water, when in a state of ebullition, seems to follow a law quite the reverse of the natural one, by the saltest, and consequently densest, water being found near the surface

* In this country it will answer best to forward these results to The Nautical Magazine and Naval Journal.

instead of at the bottom of the boiler; and hence the system of surface blowing-off.

It is, however, more than questionable that this deviation from the natural law is produced by artificial causes, and which tend to a wasteful expenditure of fuel in heating water that is unnecessarily and unavoidably blown out of the boilers, or driven out by priming. I beg to submit the following in explanation of the cause, and also the proposed method of preventing such a state of matters in a marine boiler; but for want of suitable fittings to the boilers of H. M. S. *Sharpshooter*, and also hydrometers and thermometers that could be depended on for correctly experimenting, I am unable to afford *strictly* practical proofs on the matter; but these can at any time be readily obtained in any sea-going steamer where proper instruments, &c., are to be had for experimenting with.

By the present system of feeding boilers the water is introduced *at the bottom of the boilers*, at a temperature *of about* 100°, at which temperature (it is presumed that) its specific gravity is greater than that of the water in the boilers already heated above the boiling point (proportional to the pressure), and indicating probably between 2° and 3° of saltness by the hydrometer; consequently the feed-water can rise but slowly through the superincumbent hot water, as it must first be heated up to nearly the same temperature, *and the heat is communicated to it downwards*, and blowing out from the bottom of the boiler under such circumstances, is, in general, blowing out the freshest water in the boiler. In order to obtain the natural deposition of the water in accordance with its saltness and consequent specific gravity, the feed ought to enter and mix with the water in the boiler at or near the surface, and with a temperature of at least 212° imparted to it, *before leaving the feed-pipe and mixing with the water in the boiler*. The feed-water would then be thrown in and remain on the surface, whilst the saltest water would be found in accordance with its specific gravity at the bottom of the boiler, and in that case the blowing out from the bottom of the boiler would discharge only the brine of supersalted water; and it is presumed that much of the priming and commotion of the water in the boiler, partly caused, no doubt, by the continual intermixing of the feed with the brine in passing through each other, would thus be prevented.

The feed-water can be heated in various ways, and without expenditure of fuel, previous to its entering the boiler; and by passing the feed-pipe round or through the interior and bottom of the boiler, and emitting the feed on the surface and in front of the boiler through a line of perforated pipe, the feed could in that way be made to mix with the water on the surface at boiling point; and its heat having been obtained from *the brine* in the bottom of the boiler, previous to its being blown out, probably but

little, if any, fuel would be expended in thus heating the feed-water. The object of delivering the feed along the front of the boiler, is with a view of maintaining the water there more steady and free from commotion, so that the indication of the water-guages may be depended on with more certainty than they can be at present, especially if the boilers are fomenting.

[*London Artizan.*

THE MARINE ALGAE.

BY WILLIAM HENRY HARVEY.

(*Continued from page* 121.)

This excellent paper upon the Marine Algæ should have been credited to the Tenth Annual Report of the Smithsonian Institution. Professor Harvey visited this country for the purpose of studying the marine Algæ or sea-weeds of our coast. Two parts of his work have been printed by the Smithsonian Institution, and a third will appear soon after his return from his explorations on the coasts of the Pacific ocean. The Institution is entitled to high praise for the costly efforts it has made to publish and disseminate the information collected on this interesting subject.

Three principal varieties of color are generally noticed among the Algæ, namely, *Grass-green* or *Herbaceous*, *Olive-green*, and *Red;* and as these classes of color are pretty constant among otherwise allied species, they afford a ready character by which, at a glance, these plants may be separated into natural divisions; and hence *color* is here employed in classification with more success than among any other vegetables. In the subdivision of Algæ into the three groups of *Chlorosperms*, *Melanosperms*, and *Rhodosperms*, the color of the frond is, as we shall afterwards see, employed as a convenient diagnostic character. It is a character, however, which must be cautiously applied in practice by the student, because though sufficiently constant on the whole and under ordinary circumstances, exceptions occur now and then; and under special circumstances Algæ of one series assume in some degree the color of either of the other series.

The *green* color is characteristic of those that grow either in fresh water or in the shallower parts of the sea, where they are exposed to full sunshine but seldom quite uncovered by water. Almost all the fresh-water species are green, and perhaps three-fourths of those that grow in sunlit parts of the sea; but some of those of deep water are of as vivid a green as any found near the surface, so that we cannot assert that the *green* color is owing here, as it is among land plants, to a perfect exposure to sunlight. Several species of *Caulerpa*, *Anadyomene*, *Codium*, *Bryopsis* and others of the Siphoneæ, which are not less herbaceous or vivid in their green colors than other Chlorosperms frequently occur at considerable depths, to which the light must be very imperfectly transmitted.

Algæ of an *olivaceous* color are most abundant between tide-marks, in places where they are exposed to the air, at the recess of the tide, and thus alternately subjected to be left to parch in the sun, and to be flooded by the cool waves of the returning tide. They extend, however, to low-water mark, and form a broad belt of vegetation about that level, and a few

straggle into deeper water, sometimes into very deep water. The gigantic deep-water Algæ, *Macrocystis*, *Nereocystis*, *Lessonia*, and *Durvillæa*, are olive-colored.

Red-colored Algæ are most abundant in the deeper and darker parts of the sea, rarely growing in tide-pools, except where they are shaded from the direct beams of the sun either by a projecting rock, or by over lying olivaceous Algæ. The red color is always purest and most intense when the plant grows in deep water, as may be seen by tracing any particular species from the greatest to the least depth at which it is found. Thus, the common *Ceranium rubrum* in deep pools or near low-water mark is of a deep, full red, its cells abundantly filled with bright carmine endochrome, which will be discharged in fresh water so as to form a rose-colored infusion; but the same plant, growing in open, shallow pools, near high-water mark, where it is exposed to the sun becomes very pale, the color fading through all shades of pink down to dull orange or straw-color. It is observable that this plant, which is properly one of the *red* series (or Rhodosperms,) does not become grass-green (or like a Chlorosperm) by being developed in the shallower water, but merely loses its capacity for forming the red-colored matter peculiar to itself. So, also, *Laurencia pinnatifida*, and other species of that genus, which are normally dark purple, are so only when they grow near low-water mark. And as many of them extend into shallower parts, and some even nearly to high-water limit, we find specimens of these plants of every shade of color from dull purple to dilute yellow or dirty white. Similar changes of color, and from a similar cause, are seen in *Chondrus crispus*, the *Carrigeen* or *Irish Moss*, which is properly of a fine, deep, purplish red, but becomes greenish or whitish when growing in shallow pools. The *white* color, therefore, which is preferred in carrigeen by the purchaser of the prepared article, is entirely due to bleaching and repeated rinsing in fresh water.

Many Algæ, both of the *olive* and *red* series, and in a less perfect manner a few of the *grass-green* also, reflect prismatic colors when growing under water. In some species of *Cystoseira*, particularly in the European *C. ericoides* and its allies, these colors are so vivid that the dull olive-brown branches appear, as they wave to and fro in the water, to be clothed with the richest metallic greens and blues, changing with every movement, as the beams of light fall in new directions on them. Similar colors, but in a less degree, are seen on *Chondrus crispus* when growing in deep water; but here the prismatic coloring is often confined to the mere tips of the branches, which glitter like sapphires or emeralds among the dark purple leaves. The cause of these changeable colors has not been particularly sought after. The surface may be finely striated, but it does not seem to be more so than in other allied species, where no such irridescence has been observed. In the *Chondrus* the changeable tints appear to characterize those specimens only which grow in deep water, and which are stronger and more cartilaginous than those which grow in shallow pools.

Fresh water has generally a very strong action on the colors as well as on the substance of marine Algæ which are plunged into it. To many it is a strong poison, rapidly dissolving the gelatine which connects the cells, and dissolving also the walls of the cells themselves; and that so quickly that in a few minutes one of these delicate plants will be dissolved into a shapeless mass of broken cells and slime. Many species which, when fresh from the sea, resist the action of fresh water, and may be steeped in it without injury for several hours, if again moistened after having once been dried, will almost instantly dissolve and decompose. This is remarkably the case with several species of *Gigartina* and *Iridæa*. The first effect of fresh water on the red colors of Algæ is to render them brighter and more clear.

Thus *Dasya coccinea*, *Gelidium*, *cartilagineum*, *Plocamium coccineum*, and others, are when recent of a very dark and somewhat dull red color; but when exposed either to showers and sunshine on the beach, or to fresh-water baths in the studio of the botanist, become

various tints of crimson or scarlet, according as the process is continued for a less or greater length of time. At length the coloring matter would be expelled and the fronds bleached white, as occurs among the specimens cast up and exposed to the long-continued action of the air; but if stopped in time and duly regulated, the colors may be greatly heightened by fresh water. Some plants which are dull brown when going into the press, come out a fine crimson; this is the case with *Delesseria sanguinea*, though that plant is not always of a dull color when recent. Others, which are of the most delicate rosy hues when recent, become brown, or even black, when dried. This is especially the case in the order *Rhodomelaceæ*, so named from this tendency of their reds to change to black in drying. The tendency to become black, though it cannot be altogether overcome in these plants, may often be lessened by steeping them in fresh water for some time previous to drying. Hot water generally changes the colors of all Algæ to green, and if heat be applied during the drying process, an artificial green may be imparted to the specimens; but such a mode of preparation of specimens ought never to be practised by botanical collectors, though it may sometimes serve the purpose of makers of sea-weed pictures.

SHIPBUILDERS AT WASHINGTON.

With some reluctance we give place to the following tart communication. The writer will find the school of adversity a profitable one for an apt scholar.

Messrs. Editors:—The bidding for the construction of the Steam Revenue Cutter, threw into Washington a new class of men seeking Government patronage. It was a novel scene to observe the evolutions and gyrations of our craftsmen working their way through the rooms of the Treasury Department and the parlors of the White House, to obtain the preference in building a small steamer. The New-Yorker appeared lost as in a country town, though he elbowed his way with amazing energy, as he would do in Wall or South-street at home. Although the race was to the fastest, strongest, and best, as developed in model and plans, yet most competitors imagined it was *men* that was under examination—not models—that it was the *reputation* of shipbuilders, and not their *specifications*, that would decide the battle. Those who had least faith in the ability and determination of the Treasury Department to honor its advertisement by a *bona fide* selection of the most meritorious model and plans, made the most vigorous efforts to save themselves by "works." We do not wonder at this. Shipbuilders are of all men the most *practical*. They make their models by the *eye*, and are therefore sharp-sighted. If they launch a ship, they lay ways first, and experience teaches the wisdom of a liberal use of lubricators. Moreover, it is the time for launching when the tide is up. officials at Washington will long remember the Cutter contest. In

of tools, shipbuilders are generally expert and energetic, and prefer to handle sharp ones. The augur first, and then the chisel and mallet, cut many a mortice into influential timber. Innumerable holes were made at random, and had our busy carpenters been at work on the old Ship of State, she would have been riddled. But the venerable Sage of Wheatland came to the rescue. The Commission being scuttled or exploded, and a fire-ship or two set adrift upon the Treasury Department, the battle was ended by launching the lightest craft, and awarding the victory to the most skillful General. We believe the President decided that Wm. H. Webb was *the best man* to build the Revenue Cutter. It is to be regretted that the question was not decided upon the merit of model and plans; but that it was not, was perhaps the fault of the Commission. They did not agree upon the best; but attempted to shift the responsibility of professional and mechanical criticism upon the shoulders of the Secretary. In doing this, it fell to the ground. The result only proves that Washington is the wrong place to go to with improved plans in Naval Architecture for a solution of their relative merits. What cannot be determined, cannot well be appreciated, and *vice versa.* Washington does very well for the Seat of Government, but the *locum tenems* of ship-building is in some other part of our country.

It was amusing to your correspondent to see a grave Commissioner using *a flat bar of lead* with which to compare the transverse sections of one model with another, and hardly more than two models made by the same scale! One of these gentlemen denominated the room containing the models, the *school-room*, and although age had adorned his locks with silver, we could not help thinking a young man could have entered that room and acted as Teacher to great advantage to the country, provided he had a talented class of scholars. Without a master, this school lasted for the term of fourteen days. We have heard of one diligent scholar who poked around the models by day and pored over his lessons at night—he wore out the digets by figuring, got puzzled in applying the laws of fluid resistance to such flat bottomed craft—and at last concluded that the solution of the "best" model lay in his *eye.* We think if a solution of vinegar and water was applied to his lacmyral glands, his perspective abilities might be enlarged. However, he may select his own eye-water, his vision was not clear enough to select the best model. The case would have been different at a feast.

Men are inclined to make money everywhere, and on contracts especially. It is thought by some that engines built on the inclined principle, superior to all others—for this reason an inclination was manifested by engineers to have Government adopt it on board the new s very well; but not knowing whether the Departmen'

would be inclined to adopt the "inclined engine," it was obvious an inclination was effected to incline the Board of Engineers towards it favorably. The inventor sat upon the Board to judge of its merits in person. This was a great point gained—for having, it is said, designed the engines for one of the bidders, they were understood without examination, and a positive opinion upon the best specifications of Engines was thus already arrived at. To this mode of introducing the "inclined engine," most bidders were inclined to take exception. There is no accounting for inclinations any more than tastes.

It has been poked under our notice that the father sat in judgment upon the model of his son, in another case. Your correspondent can see nothing amiss here. It is well known that although produced at the workshop of the son, some journeyman done the execution of the model, and hence it was not strictly a family affair. That the father changed the scale to bring the model to proper dimensions, did perhaps evince a desire to select it; but as the tragedy ended in farce, the inclinations of the Commission took another channel. Without "fast" friends, "strong" backers, and the "best" arguments, Washington is no place for an ambitious Shipbuilder.

SPLINTER.

THE BOILER CONTROVERSY.

BY "ENGINEER."

MESSRS. EDITORS:—We desire to reply to the last two articles in the May number. First, in reply to L'Clair, as to his having witnessed the irretrievable failure of the Montgomery Boilers, as Marine Generators. He has already been repeatedly asked that the time and that the particular Boilers that were such failures, should be indicated: once more we say give them a local habitation and a name; no more mystery—no gasconading—no evasion. We demand that the particular Boilers be distinctly pointed out. Failing to do this, we will brand the author of this slander as he deserves. It is true, he admits the success of the invention in an indirect way, by saying that they were failures as *Marine* generators. L'Clair next has the cool audacity to say, in the face of the notorious facts proved by the documents accompanying this paper, "in the entire absence of satisfactory evidence of the practical success of these Boilers," &c. The documents above named, prove an amount of success in the practical generation of steam never before equalled or approached by any inventor in either the new or the old world: and proved too by L'Clair's own pets among the rest, as several chief as well as assistant engineers admit, over

their own signatures (as shown) the peerless character of this class of Boiler, as arranged by its inventor, Mr. Montgomery. Examine the accompanying tables and letters signed by Chief Engineers J. Farron and also William Sewell, together with the other Naval Engineers, Messrs. Hall and J. M. Adams. The names of Chief Engineer C. H. Haswell and Charles W. Copeland can be added to the list, if desired. These men as a general thing, take sides with the head of their department, as is very natural for them to do, if but to conciliate an officer who has the power over his subordinates to injure their interests if they incur his ill-will. Nor are these the only elements at work: as it is a well understood thing that no outside barbarians are to be allowed to tread the aristocratic precincts of the Navy Department—all the emoluments are to be kept in the family. In short, the routine and red-tape system prevails to an extraordinary extent. Hence the miserable lists of failures on our steamers, which go on day by day and year by year, increasing piles of old iron, being the remains of defunct engines and boilers that have failed, costing the country immense sums of money, and worse still, covering it with disgrace and ridicule, at the same time leaving us, at most, with but the shadow of a Navy, so far as our steamers are concerned, the most of them being fitted to act merely as scare crows to frighten off an enemy, being in fact little better than tubs, in which our brave sailors may loose their hard won laurels and their lives at one and the same time.

But to return from this digression, to the audacious and impudent twaddle about "superfine speculation," "the ease of building boilers upon paper," and the "difference between this and actual practice," &c., &c. Compare now these unblushing statements with the facts. Take for example the experiments made on the steamer *Heartt*, by the Naval Chief Engineers, John Farron and William Sewell, with the other Engineers in the employ of E. K. Collins and his Company—Prof. James Renwick, so well known, being also retained by the Company to supervise the whole. What appears to sustain this much abused, traduced, and wronged Inventor? Is it not shown that several pounds *more* water is evaporated with a given quantity of coal, than by what is mis-called the Martin Boiler, (which we have already said was Mr. Montgomery's invention, tortured out of shape by men ignorant of its true elements, the objects of which will presently appear, and this too with the first Marine Boiler he had ever built, the tubes being simply of iron, while those used by Mr. Martin (he having the Government Treasury at his command) are of brass, this being a favorite metal with him. Now as brass conducts heat about two and a half times as fast as iron, it follows that Mr. Montgomery labored under a serious disadvantage, as the same amount of superficial surface of brass

would (if well arranged) make more steam than the same superficies of iron.

Take also Engineer Hall's report to the Secretary of the Navy: he having been ordered on board this ship for the purpose of making a series of observations at sea, using salt water, on the run from Baltimore to New-Orleans. It appears that 10.1 pounds of water was evaporated to the pound, of indifferent coal, although the Boilers were new, and consequently more liable to foam, and did so, thereby reducing the economy from the usual well known cause, making at the same time little or no scale.

This party was not sent on board by Mr. Montgomery, but on the contrary by one of his worst opponents, the then Engineer-in-chief, C. H. Haswell. Thence it may well be inferred that he was not there to show how much the Boilers did, but the contrary, as his own writing proves, as the tenor of his report is of such a nature as to show an endeavor on Mr. Hall's part to explain away the extraordinary results obtained from this ship's Boilers, driving two engines, using a much larger quantity of steam than is required by the engines of the Mississippi Frigate, where the fire surface was 7,676 sq. ft. against less than 5,000 sq. ft. in the other, covering a horizontal area of but 264 sq. feet. against the Boilers of this Frigate, which are admitted to cover over 700 feet of area. The amount of grate too in the Erigate was enormously larger than that in the Boilers of her competitor, in the proportion of over three to one. The competing vessel, the J. P. Whitney, had engines of 48½ inches bore, 8½ feet stroke. Thus it will be seen that the cylinders were of much less capacity as to contents: but from the fact that the merchant steamer had a very small diameter to her wheel, thus more than doubling her revolutions, and was a swifter vessel, carrying also an enormously greater pressure of steam, and following farther along the stroke—owing to these facts a much greater quantity of steam was required and had in the engines of the J. P. Whitney than in those of the Mississippi. As to the statement of Engineer Hall that all Tubular Boilers are economical of fuel, I will but ask those who feel an interest in this controversy, to refer to Bartol's *compilation* of American Boilers, in which it will appear that so far from 8 to 9 pounds being vaporised, that instead but 5 to 6 pounds are done, unless in the Boilers of the Monumental City, which are reported to have evaporated 8. An examination of the facts however, will show that she did not average more than 5 pounds.

As to the ordinary Tubular Boilers making comparatively little scale, it is a well known fact also that they make more scale than any Marine Boiler known. Engineer Adam's report will be vouched for in all the leading particulars by the Heads of the Department, to which the steamer in his letter refered to, belongs. The shells of these Boilers were built of

3-16 inch iron only, and that too for use in salt water. Even Chief Engigeer Isherwood calculated the evaporation in the Boilers to be equal to about 11 pounds of water to the pound of coal. The evaporation in the Boilers of Capt. Charles Stoddart's ship, the Lafayette, was equal to over ten pounds, as will be seen on calculating the elements. This is also true of the Union shown in Bartol's book before referred to. These Boilers were arranged by Mr. Montgomery, and not by Messrs. Rennie, Neafie & Co., as is alleged in the book named. The results attained on this ship were extraordinary, both as to economy of fuel, and especially the generation of steam, the supply being with a low blast enormously greater than the contract called for—as, though but 20 pounds were required, 45 pounds could be maintained with ease, driving the vessel at a speed under steam alone that the Niagara will be fortunate if she equals under steam and sail combined.

But we have inadvertently said more on this subject than we originally intended.

We will merely remark in dismissing this part of our controversy, that we can pile up any amount of facts to sustain all that we have said, and can add any amount of documents to those we have here published, all going to prove the statements advanced, which documents are made by men of the highest standing in the community, both for ability and character.

As to the pity or sympathy talked of to be extended to the contractor of the Egyptian steamer, we have no doubt that the said contractor feels deep gratitude for the sympathy, and all that kind of thing, but we trust it will not be deemed out of place here to say that Mr. Stone is himself an accomplished Engineer—quite as well qualified to judge of the merits or demerits of a set of Marine Boilers as even L'Clair himself, and therefore we have no doubt that he will find that careful observation and calculation will have furnished in this as in others, elements that will carry him out to as successful an issue as L'Clair and his instigators, in their —*would not desire.*

Seneca, in his turn, vaunts the surprising compactness, small weight, superior general arrangement for cleaning and repairing, with ability to withdraw tubes and clean the same of the Mississippi's boilers.

The reader will now compare this with a set of boilers arranged by Mr. Montgomery, the extreme height of which is seven feet nine inches against the Frigate's fourteen f[illegible] and yet so arranged that every tube in the boilers will [illegible] the lowest part of the shell. Nor is this all; there a[illegible] of *two.* A war steamer cannot afford to lose half [illegible] an accident, in the face of a superior force, or [illegible] strain every pound of steam to get off.

Again, the many tube boxes involve internal water-ways, the flat sides of which are stayed with bolts, the heads of which are very liable to leak; in the event of which one-half the tubes in the contiguous box must be destroyed in their removal to repair the leak. In the Montgomery arrangement there are no internal water-spaces, as there is but one box in each boiler; thus the heads of the stay-bolts are on the outside; and in the event of leaking the bolt can be drawn out; a taper tap will then retap the holes, and a bolt of corresponding form can now be introduced from the outside. The effect of tapering the bolt is, that it can be made tight without rivetting over the inside end; as by simply screwing the bolt hard in, it becomes tight from the obvious fact that it becomes larger the farther it enters.

Contrast, now, the weight: each of these four Montgomery boilers will weigh but twelve and a half tons; thus aggregating fifty tons against the alleged weight of the Frigate's boilers of one hundred and eighteen. Nor do we stop here: not only are these boilers of but half the height as stated, but they do not, at the same time, take up as many cubic feet in the ship by a full third, while the arrangements for bunkers are vastly superior; as the coal lies between and immediately around the boilers—not only more convenient to the firemen, (as it is but necessary to open a slide, and the greater part of the coal will run down alongside the furnace doors by its own gravity,) but what is of immensely more importance is, that the coal forms an admirable shield to protect the boilers from shot and shells, as the coal immediately around the boilers would be kept as reserve coal, which all prudent commanders keep for emergencies.

The next item is *cost*, which would be but little more than one half; although it must be obvious to every practical engineer that Mr. Montgomery could build the boilers in two pieces, to take up much less room, and at less cost. We will now close this branch of our subject by saying that the elements of the within Boilers are the same as those so successful in the numerous boilers named in the testimonials attached to this article. The amount of grate being nearly the same in each case, (to wit: 240 sq. feet in the Montgomery arrangement, against 261 sq. feet in the Martin—fire surface, 7,630 sq. feet in Montgomery's against 7,676 in Martin's) as the circulation in the Montgomery boilers is conceded, by those engineers who use them, to be much greater than in the Martin form, this insures, as shown, a greater economy of coals; thus less grate is requisite, as there is less coal to burn for a given amount of duty.

We will conclude this article with the remark, that it is unjust to class Mr. Montgomery with Steenstrup, a man who was never heard of as a practical engineer on boilers, beyond the patent issued to him in England thirty or forty years ago. As for Dr. Nott and his fa

are thousands here who know the miserable failures of these boilers, involving certain works in utter ruin at the time, as the proprietors, of whom Dr. Nott was the principal, expended enormous sums of money, to force the thing into an artificial life, finding that it would not go of itself, as the fuel burned was at least four times as much as is now burned in the Montgomery boilers, as arranged by their inventor. Nor was this all, as the tubes burned out to an extent ruinous to the unfortunate people using them. Volumes might be told of this tenor, as to the whole class of these abortions, including those of Napier and Dundonald, who are both accused of pirating from Dr. Nott, of which last we know nothing; we will merely remark, that if it is true, the parties have already paid dearly the penalty of their course, in the miserable failures that have resulted from their attempts at practical embodiments of their so-called improvements.

We will add, that in view of the facts detailed in the foregoing, showing the extraordinary success that has attended the Montgomery boiler from the first one that was built, and their continued success up to the present hour, we must say that L'Clair's assertions exceed, in sublimity of impudence, everything we have ever seen, even in this fast age.

Want of time, alone, compels us to defer the rest of this article until the next number, when we will endeavor to satisfy L'Clair and the rest of his friends.

We will add but this remark—that Mr. Montgomery has sued the Collins Company in heavy damages for the piracy of his invention, including the set of boilers now on the Adriatic, which boilers Mr. Martin, with a modesty equal to that of L'Clair, himself, claims to be his invention. The suits will come off in a few months, when this peacock will return to his original shape.

Mr. Montgomery will then stand before the public as the man who, amid a storm of ridicule and machination of no mean order, strove, during a period of many years, to introduce and inaugurate the true theory of generating steam. How he has succeeded, the public can judge by what the man has done. Honor and justice to those who have earned the right to both is our motto.

The following are the documents and testimonials above referred to, beginning with the report of Wm. Sewell, Jr., and John Farron, U. S. Engineers, to E. K. Collins, Esq.

THE EVAPORATIVE POWER OF MONTGOMERY'S PATENT BOILERS.

	Tot. coal cons'd in lbs.	lbs. coal pr. sq. ft of grate pr. hour	Ashes	pr. ct.	Mean pressure of steam.	Temp-erat're of air.	lbs. wat'r evapora'd at 212° by 1 lb. coal	Same by 1 lb. of com-bustible
J. C. Heartt, March 4th, 1848—Lackawana Coal	4,557	19.3	725	15.9	22	31°	9.336	11.103
J. C Heart, March 7th, 1848—Lackawana Coal	4,593	16.75	817	17.18	28	31°	10.109	12.297
J. C. Heartt, March 7th, 1848—Coal from Black Heath Vein of Im't Co.	4,740	18. 4	567	11.95	27	40°	9.917	11.264
J. C. Heartt, March 8th, 1848—Cumberla'd Coal	4,620	16. 8	500	10.82	25	25°	10.114	11.593

The J. C. Heartt's boiler was cleaned on the night following the first day's trial. It had not been cleaned in the lower division of the boiler for two weeks, and in the upper division for one week.

In the same connection Simon J. Snyder, the Engineer of the Heartt, and Lyman Kirkland, his assistant, agree in saying: "I have been using Mr. Montgomery's Patent Boiler on board the steamboat 'Jonas C. Heartt,' for the last two years. In justice to the boiler I must say, I have never seen anything in the way of a steamboat or any other kind of boiler to come up to it, either in the way of economy of full weight of boiler or space occupied in the boat. We have a 25½ inch cylinder, 7 feet stroke, and carry from 30 to 45 lbs. steam. The boiler is 12 feet long, 6 wide, and weighs 5½ tons, and can with safety say there is in fuel a saving over the old boiler of 40 per cent. Our old boiler was considered the best boiler for economy in use, it was 16 feet long, 7½ wide, steam chimney down to water legs, 16½ feet, and weighed 8½ tons when taken out. But it could not begin with the Montgomery Patent Boiler. We have a bad route to run, on account of the water being fresh part of the way and salt the other part, which every engineer knows will make a boiler foam the worst kind, but can always tell where the water is in this boiler. For an experiment we used salt water six weeks steady, but not a particle of scale made in the tubes."

Prof. Renwick says, "I have examined a plan of a steam boiler proposed by Mr. James Montgomery, and have seen one constructed by him in practical operation. From this examination of the principle and from its success in practice, I feel warranted in stating that this description of boiler is a great improvement upon any now in use; that steam may be got up in it in less time than in any other; that there will be a very large saving in fuel; that it will be more durable than any other form of tubular boiler, and that it will occupy less space."

And Mr. Nathan Thompson, Jr., reports to Mr. E. K. Collins, as the results of his investigations, that "The consumption of fuel is 40 per cent. less than in any other boiler with which I am acquainted, while its efficiency in generating and maintaining a pressure of steam is unequalled. The space occupied, when compared with the boilers commonly used, is one third less, while at the same time the weight of the boiler is reduced in the same proportion. The fire surfaces of this boiler are not liable to be rendered inefficient by the deposit of sediment or the formation of incrustation; for, owing to the peculiar application of the heat, strong ascending currents are produced, th- [illegible] which preserves the tube surfaces perfectly clean—the sedimentary matte [illegible] -st point of the boiler, where it may be blown out at pleasure, for, [illegible] does not become

an incrustation. The peculiar arrangement of this boiler prevents the inconvenience and danger arising from 'foaming;' this great advantage is in consequence of generating the steam so near the surface of the water, and so equally over the surface.

The experiments of which I have here given you the general results were made on board the steamboat "Jonas C. Heartt" and the comparisons are made with the boiler used in her immediately previous to the trial of Montgomery's boiler, and that was generally considered one of the most compact and economical on the river."

Mr. E. K. Collins, moved by his eyes and these opinions, thus writes in 1847: "Having perused a letter of Messrs. Hooper and Brothers, I was induced to call at the factory to see the engine work, having a great desire to get the best information I can on generating steam. I employed a practical engineer to run the engine for 5 hours, which he did, driving seven saws, and burning 250 lbs. of anthracite coal, with an average pressure of at least 55 lbs. of steam, as near as could be ascertained by the safety-valve. Gases in the chimney averaging about 130°, and in but one instance over 150°, and that for five minutes only. The boiler was recommended as worthy of trust by Prof. Bache, but not by Prof. Renwick, previous to its being built; the latter has seen its performance, and has given high testimonial of its superior qualities over any other boiler for generating steam."

And his Engineer, Mr. Thomas Oliver, says, "I take great pleasure in stating that the results of the experiments which I made about a year ago for Mr. E. K. Collins, with one of your boilers, and examinations, afterwards, of several others in use in this city, have proved, to my entire satisfaction, that your boiler is superior to any other in use, for all the various purposes for which steam may be used—that is, will save from forty to fifty per cent. of fuel, and that it is more compact, occupying much less space than other boilers of the same capacity."

Here is the report of W. K. Hall, U. S. Engineer, to the Secretary of the Navy, with regard to the boilers on the J. P. Whitney in 1849: "In obedience to your order of the 23d ult. I reported on board the steamer 'John P. Whitney,' and proceeded to New-Orleans. The two boilers are of iron, using anthracite coal with the aid of a blast. The average consumption of coal per square foot of grate per hour is 17.87 lbs. giving an evaporation of 10.1 lbs. of sea-water, under a pressure of 18 lbs. per square inch, for one lb. of coal. In ordinary flue boilers, under similar circumstances, from 6 to 9 lbs. of water are evaporated by 1 lb. of coal."

Mr. William Bisby, the engineer of this boat, also says of the boilers, both in 1849 and 1855, that—"I never saw either of them foam for a moment, whether in clear fresh water, clear salt water, or even in Mississippi river water. I burned but from 5-8 to 3-4 of a ton of anthracite coal to the hour, and at no one time did I not have more steam than I could work off with two 48 inch cylinders, 8½ feet stroke. The coal I used was not by any means good, having no strength and making no cinders. The boilers are 12 feet 6 inches long, 10 feet wide and 9 feet high, containing about 5,000 feet of fire surface. The Whitney is fully 550 tons burthen, and is an efficient boat under every position in which I have seen her placed. I saw no scales whatsoever in any of the tubes after our arrival at New-Orleans, and a very little Mississippi mud was all I could find. The consumption of coal was about 1 lb. to 10½ lbs. of water. The boilers, whether at sea or on the river, never gave us the slightest trouble; the only care necessary was to keep our firemen from carrying too heavy fires.'

Mr J. M. Adams, U. S. Engineer on the Hetzel, says: "I used your boilers two years on board that steamer, and I must say that a better boiler to make steam and burn less coal, I never had charge of. During the two years they gave me no trouble, with the exception of few tubes which gave out at bottom sheet, which were easily stopped by a pine plug with

a hole through the centre of it. It averaged a pressure of 28 lbs, consuming 421 lbs per hour, burning hard coals with the natural blast, with 30 inch cylinder, 7 ft. stroke, making 18 revolutions per minute, and made 8 knots. I would have no hesitation in going to sea with your plan of boilers, provided they were properly constructed."

As to economy, the following note from James Millholland, Esq., is to the point: "It (the boiler) consumes but 1½ tons of anthracite coal per day of 12 hours, and is now doing the work of 4 36 inch boilers 20 feet long, with a heater under each of 12 inches diameter, and 12 feet long. Under the old boiler we consumed 4½ tons per day."

In regard to durability, we hear thus from Hecker and Bro., in 1849: "It gives us much pleasure to state that since we have used your boiler, we have saved by it at least 40 per cent. of the fuel used by our old boilers, which were among the most economical at that time. Our boiler is one hundred horse power, and has been kept in unceasing operation day and night, costing during that time *nothing* to keep in repair; and it is at this moment apparently in as good order as the day when first set. We use now from 3½ to 4 tons of coal per 24 hours, when seven and eight were formerly required to do the same work. We have no hesitation in saying, from our experience and observation, that we consider your boiler *the best now extant*." And again in 1856: "It is now nine years since we put in the first boilers built on your patent. We can now add, in addition to the good qualities stated in our first letter, that we are still using the same boiler with the same tubes, never having removed or repaired one of them."

ENGINEER.

SPEED AND DURABILITY OF OCEAN STEAMERS.

EDITORS U. S. NAUTICAL MAGAZINE AND NAVAL JOURNAL.

Gents:—I would respectfully ask through your journal, whether an average business speed of 18 knots per hour, is attainable along the Atlantic coast, for a distance not exceeding 800 miles from port to port? And whether a steam ship of that speed can be made strong enough to enjoy the usual life of a sailing vessel?

PROGRESS.

The above letter comes to us from a distinguished U. S. Senator, and bespeaks an enterprising spirit worthy of the age in which he lives, and the country to which he belongs. In answering him, we may, perhaps, render a service to others, whose constructive labors indicate a limited amount of knowledge in the principles of mechanics. The history of the past half century has shown our progress in pushing nautical and commercial enterprises to their utmost limit to be such, that once in every 10 years a new type of vessel is required to meet the wants of trade. It is but 30 years since the Liverpool packet ships began to be introduced; at the end of the next 10 years, they were remodelled and enlarged with poop and topgallant fore-castle decks. The next periodical change brought the Clipper Ship, and the Ocean Steamer, and another 10 years has elapsed, and we find the Clipper Ship mania fairly run out, and Ocean Steamers are unprofitable.

Hence the importance of the inquiry. It is but too manifest that something must be done to meet the wants of trade and travel, while there is an increasing demand for speed in Ocean Steamers; the several transatlantic lines are falling off, and while the watch-word of the Collins line at its first inception was 10 days, it is now difficult to average 11 days in crossing the Atlantic. There are two problems requiring a solution. First. Is the speed named attainable, and if so, will the vessel be lasting?

We give an affirmative response to both of these questions, and shall endeavor to demonstrate its correctness. Every observing ship master as well as ship owner, has discovered that vessels are more stable and enduring when in a state of rest, in port, than when under the pressure of propelling power at sea. Upon the back of this follows another truth equally clear and incontrovertible. It is this: There is an *adapted speed* to every vessel, regardless of her form or the manner in which propelled, whether by wind or steam; beyond this speed, it requires a very great increase of power to force her, and when forced, the effect is made manifest in straining the vessel. The only visible elements causing deterioration in vessels, aside from the destroying hand of time, are the commotion of the sea, and the resistance to propulsion, as shown in the wave of foam which precedes all vessels of the ordinary type of model, drawing an amount of buoyancy equal to the bulk of the wave at the bow from the more bulky parts of the hull, and in a manner too plainly indicating the amendments nature proposes in the model, at the bow, and at the same time pointing to the consequences of leaving the more central parts unsupported by the full measure of buoyancy to which they are fully entitled by the laws of flotation. The adapted speed to which every buoyant fabric is entitled, is always proportionate to the weight of the fabric with its contents; these are always equal to the weight of water displaced by the vessel or floating body. The foregoing truths may be learned by observation, and are not dependent upon the axioms of science.

Philosophy teaches that the elements of success in ocean navigation, consists in the proper distribution of buoyancy. This has been left to the eye of the Architect and the Ship Builder, while the laws of propulsive resistance have remained an unpublished chapter in nature's code.

If the distribution of buoyancy on the model is not in accordance with, or adapted to the speed required, every effort to force the fabric beyond that adaptation, must tend to strain the vessel, and propelling power may be so increased as to sunder her into fragments. The inceptive theorems of ship owners, and particularly the owners of steam vessels, has been, that the amount of propelling power must determine the speed, whereas nothing can be more absurd. There is a law in the application of propelling power, which teaches that steam power can only be applied ruccessfully when its

amount is commensurate with the speed required. All beyond, or outside of this, is based on crude notions of the elements of speed and power.

It is necessary that the ocean steamer should maintain as near as may be, that amount of stability at sea which she exhibits when in harbor; and that vessel which maintains her natural line of flotation at sea, with the greatest proportionate amount of propulsory power, will be the fastest, and at the same time will be the most enduring;—every element of strength as well as buoyancy is based on these immutable principles. The idea of great speed and durability, apart from great stability, is founded on error, and must ever lead to the most mischievous results. The formulas for the determination of stability are also equally baseless, although followed by those who claim to have learned all that is worth knowing in Marine and Naval Architecture. The elements of great speed in ocean steamers, *consist in securing a large amount of power, with the least possible weight, the buoyancy geometrically distributed within the best principal dimension.* When these elements are secured, 18 and even 20 knots per hour, may be maintained as the average business speed of ocean steamers for short distances within one thousand miles.

The buoyancy and the strength of vessels should never be separated, inasmuch as the most buoyant is always the weakest part; in the present mode of construction, they are always apart; the ends of the vessel is always the strongest parts, while the middle and most buoyant part is always the weakest. Midway between the two ends of the vessel is the shoalest part, while at the same time it is the widest part of the vessel, and as a consequence, the sides and ends in which the most of the strength is found, are farther from the middle, and consequently the most buoyant and at the same time most bulky for cargo, have the least assistance from the fountains of strength, and if the vessel be a side-wheel steamer, the propulsory power is also applied at this weaker part. But it is not enough to show that the middle and buoyant parts of vessels are the weakest, but it is incumbent upon us also, to show why they are thus weak. We say and will show that it is because the materials of construction are neither in quantity nor distribution commensurate with the strength and service required.

If a steamer 300 feet long were to be built in 3 lengths, we grant that the materials would be sufficiently large and furnish sufficient strength for the service—but inasmuch as she is 3 times as long and 3 times as wide, as well as 3 times as deep, the materials should be nine times as large. If a vessel is found to be sufficiently strong while she remains at the wharf with cargo on board, for an ordinary life-time, and that on the application of propulsory power, she is found to be less enduring, causing leal whether arising from the inequality of the strain upon the differ

of the fabric, or the burden sustained, it will at once be conceded that her strength was not commensurate with the service to be performed. If it be true that a vessel at sea, uninfluenced by propelling power, is subject to a greater amount of strain from the commotion of the waves than when in harbor, the consequence is that she is under still greater stress when propelling power is applied. We have thus shown two of the elements of deterioration.

We shall next proceed to show how utterly inadequate vessels are for the service to which they are subjected. We will first assume that there is a determinate size to which the present mode of construction furnishes an amount of strength commensurate with the service required. For the purposes of illustration we will assume that size to be about 200 tons, allowing the principal dimensions to be 100 feet long, 20 feet wide, and 10 feet deep. By referring to the Ship Builders' Manual, we find tables which have been prepared with great care, furnishing the proportionate dimension of the timber for vessels from 100 to 300 feet—see pages 140 and 169. These proportions are considered wlth reference to the maintainance of equal strength in all the variable sizes of vessels, assuming the increase of strength to be commensurate with the increased acting surface exposed to the sea, which is not the case. A single element in these tables will suffice to show how futile are the efforts of Ship Builders to secure an amount of strength commensurate with the increased size of vessels upon the present practised basis, while the capacity increases as the cubes and the strength increases only as the squares.

The point referred to, may be found in the scarphs of the frames as well as the breaking of butts in the planking. A vessel of 100 feet length, should have her frame timbers sided 6 3-4 inches, with a lap to those timbers of 5 times the siding size, which would give nearly 34 inches lap in framing, while on the 300 feet vessel, by the same proportion, the lap should be over 8 feet 8 inches, and the siding size of timbers should be 20½ inches, the fastening should not only be increased in proportion, but should be increased in diameter as well as in drift. In view of these facts, the man of observation will not fail to discover that the practice of exclusive wood construction for vessels, has no basis in the science of marine economy, whether regarded as a means of securing strength, durability or speed. We have but to consider that a vessel 300 feet long, of the same proportionate breadth and depth, as the vessel of 100 long, and with the same exponent of capacity, would have 27 times the capacity for cargo, all things else being proportionate, and we discover that the strength of this vessel has only gained 9 times that of the 100 feet vessel. Here we have 27 [illegible]s the surface exposed to the action of the sea, and 9 times the strength [illegible] feet vessel, and what is still more strange, the ship owner and

underwriter wonders why so many large vessels are lost, attributing the great number of disasters to the dangers of the sea, when in fact it is nothing less than the dangers of the ship. But what, if possible, is still worse, the buoyancy is crowded so far toward the extremities, while the midship body is so contracted in breadth, and extended in depth to avoid tonnage, that the weight of the vessel is extended far beyond a limitable degree of speed commensurate with the propulsory power, causing the momentive labours of the vessel consequent upon instability, to draw too largely upon the small capital of strength furnished by this ill-proportioned and worse distributed system of construction. From what has been shown, it must appear manifest that there are two points to be gained before a great business speed can be maintained, and the usual life of the vessel be at the same time preserved. The first of these is a proper distribution of buoyancy and weight. The second is: an amount of strength commensurate with, and proportionate to the size of the vessel and her adapted speed. But how shall these be obtained? We answer, the proper distribution of buoyancy may be obtained, and adequate strength can be given.

The model of the fastest and sharpest steamer, whether river or ocean, would surprise the builder not less than the owner, when brought within the luminous rays of Geometrical science, at its disproportionate distribution of bulk and capacity, and the wonder will be that these distorted forms have been tolerated so long. In reference to the required strength, we may remark that inasmuch as iron is 14 times as strong as the best ship-timber, and but 7½ times as heavy, it will become at once apparent that a larger mixture of iron should be distributed throughout the construction of vessels. But this is not to be done in bolting only. The usual securities in the weakest parts of the wooden fabric, must give place to entire constructions of iron.

There has never yet been an effort made to secure a combination of strength commensurate with an extraordinary rate of speed. The efforts made on our rivers, are scarce worthy of the name, inasmuch as river boats are too fragile to sustain the power applied for any considerable time, without the most marked effects of fragility of construction. The durability of steam vessels is consequent upon the intrinsic strength of the fabric to withstand the concussive shocks of the sea, and the combined power of the engines—the latter presses her onward, the former obstructs her progress. The vessel to be durable, must have a measure of strength greater than the combined power of both the engines and the resisting waves. When the distribution of displacement shall be the best for speed, and the quantity, quality and distribution of the material of construction the best for strength, then, and not until then, will Ocean Steamers either be fast, profitable or durable.

SHIPPING REVIEW.

FREIGHTS IN MAY.—The month of April closed with falling rates, and bottom was not touched till the end of the first week of May, when produce was taken *gratis*, for ballast, from New-York to Liverpool. The ship *Plutarch* was cleared with only about $650 paying freight. Large ships were almost without employment, and were never before offered for sale at such low rates. Were it not for the discovery of new groups of guano islands, many of them would have to lay up. May 6th we quote:—

Cotton to Liverpool, 3 32 *a* ½d.; Flour, 6d.; Rosin, 3d. *a* 6d. Heavy Goods per ton, 8s. *a* 10s.; Grain, 1½d. *a* 2d.; Beef, 3d. *a* 6d. To London: Cheese, per ton, 20s.; Furs and Skins, 25s. *a* 27½s.; Heavy Goods, Oils, &c., 20s. *a* 25s.; Oil Cake, 15s.; Flour, 1s.; Rosin, 1s. 6d.; Beef, per tierce, 2s. *a* 2½s. To Havre: Cotton, ½c.; Ashes, pot and pearl, $8 *a* $9 per ton; Rice, $10; Flour, 65c.; Provisions, 75c.; Grain, 20c. To San Francisco: by clippers, measurement goods, 25c. per foot; Heavy Goods, $9 *a* $10 per ton; Coal, $9 *a* $10.—To Melborne: per foot, 25 *a* 27½c. At New-Orleans, April 25th, Cotton to Liverpool 7-32d. *a* 3-16d. At Mobile, same date, Cotton, 5-16d.; business extremely dull and rates declining—vessels in the beginning of May were leaving in ballast for northern ports. On the Western Lakes we note that freights rule lower than ever they did before at the opening of navigation, which is very late in the season.

May 16th.—Freights continued depressed in all directions—offerings to California extremely light. The passenger carriage from Europe is large.

May 23d.—An improved feeling is manifest to Great Britain, though rates have scarcely advanced. Business for the coastwise and W. I. trade has measurably fallen off, and the small class of vessels now begins to feel the dullness of the times.

SEAMEN AND WAGES.

At the beginning of the month, sailors were not very plenty, but on account of the great depression in the shipping interest, but few, comparatively, were wanted, and advances have further declined. We quote:

	Wages.	Advance.
To Liverpool .... per month.	$20	$20
London	20	20
Havre	20	20
N. of Europe	18	20
Mediterranean and South America	16	20
West Indies	18	18
East Indies and California	15	30
Coasting	20	10

May 23d.—The supply of seamen has been about equal to the demand for some time past, and rates have not varied, one month's advance being paid to Europe. We hear that several large shipping houses have resolved to discontinue the system of advance wages, but pay higher wages to those who will ship without advances.

DISASTERS AT SEA.

SHIPS.

Minerva, (Bre.) Rotterdam for New-York, lost April 25, at Barnegat.
Saxton, New-York for New-Orleans, totally lost on Ginger-Bread Ground.
New-Hampshire totally lost at Jones' Beach.
American, for St. Johns, N. B., put back to New-London with loss of all three masts.
Deutchland, Cardiff for New-York, sprung a leak and sunk April 2, lat 47°, long 40°.
Wabamo, at New-York, from Antwerp, struck on Sandy-Hook beach, little damaged.
Ohio, at Liverpool, from Havana, had decks swept.
Sulina, Liverpool, for New-York, totally lost on Brown Head, near Crookhaven.
Canvass Back, Liverpool, for Boston, put into Faya leaking.
Ellen Oliver, at Malaga, from New-Orleans, had been ashore, was towed in.
Wm. Milne, Marseilles for Falmouth, in collision and abandoned March 21.
Star of Empire, Chincha Islands for Hampton Roads, got ashore near Currituck, N. C.
Joseph Clark, New-Orleans for St. Petersburg, got ashore on west coast of Ireland.
Albatross, Chincha Islands for Cork, put into Talcahuano leaky.
Unknown, was seen ashore on the Ginger-Bread ground, April 28th.
Helen E. Booker, Cardiff for New-Orleans, ashore May 1st, near Carysfort Light.
Elizabeth, Hamilton, at New-Orleans, was considerably injured by lightning.
Unknown, was seen April 26, on Little Isaacs, Bahama Banks, only masts above water.
Resolute, below N. Orleans, broke adrift, much injured in contact with two ships.
Cathedral, Philadelphia for San Francisco, abandoned off Cape Horn, many lives lost.
Invincible, at Sydney, (Australia,) was grounded in coming in, much damaged.
James Edwards, (whaler) at Mauritius, grounded on going out and put back.
Gosport, for Baltimore, put back to Liverpool leaky.
Lanerk, at New-Orleans, from Rio Janeiro, leaks badly.
Tarolinta, N. Y., for New-Orleans, got ashore on the Ginger-Bread ground.
Eastern State, London, for San Francisco, put into Valparaiso for sails and repairs.
Charles, New-Orleans for Ambriz, put into St. Thomas leaky.

SCHOONERS.

Edward Kidder, at New-York, for Boston, lost deck load, some sails, &c.
Abby, broke adrift at Boston, stove bulwarks, &c.
Cicero, at Edgarstown, from Philadelphia, struck on Handkerchief Shoal, leaking.
Burlington, (Br.) Margarettsville for Boston, totally lost near Gulliver's Hole, April 2
Liberty, Baltimore, for Saco, totally lost off Cape May April 20.
Admiral, Annapolis, N. S. for Salem, got ashore near Fort Constitution, Portsmouth Harbor.
Echo, (Br.) Nova Scotia, for Salem, totally lost on Ispwitch Beach, April 21.
Echo, of Portsmouth, in collision at Salem, lost Bowsprit, &c.
James H. Stewart, for Georgetown, D. C., dragged ashore near Point Lookout, Cornfield Harbor.
Worth, at Wilmington, N. C., from N. Y., lost some spars and sails.
Mary Ann, at Philadelphia, from Halifax, lost sails and leaked badly.
Suwassett, for New-York, in collision with steamer Louisiana, much damaged.
T. Raymond, for New-York, put into Wilmington, N. C., in distress, lost sails.
Traveller, Mobile for Honduras, totally lost on Colorado Reef, Cape Antonio, Cuba.
Julia A. Rich, for Boston, dragged ashore in the Harbor of Holmes' Hole, April 21.
Wide-Awake, went ashore at Lewis, Del., a total loss.
Tiberias, Buckport for Providence, went ashore on Chatham Bars, April 19th, totally lost.
Monte Cristo, at Newport for New-Bedford, leaks badly, &c.
Kosciusco, at Boston, from Rockland, lost foremast in collision.
Volant, New-York for Norfolk, totally lost at Berlin, Md.
Ida De la Torre, New-York for Jacksonville, damaged by fire at sea.
Golden Cloud, Rockland, Me., for New-York, went ashore on Gardiner's Island April 20.
E. J. McGee, for Philadelphia, sank April 15, at Mouth of Sassafras river.
Albert, (Br.) at Salem, was much injured by fire, April 22.
Two Marys, Conwaysboro, put into Wilmington, N. C., leaking April 24.

NOTICES TO MARINERS.

MACLESFIELD SHOALS.—Lieut. Maury has favored us with a copy of the following letter, addressed to him by Capt. Moses, of the Siamese man-of-war, *Bangkok*, which relates to the important Maclesfield Shoal. The least water given by the charts generally for these shoals is 5 fathoms, and it will be well for navigators, while crossing these shoals, to recollect that there is as little, at least in one place, as 4½ fathoms:

NINGPO, CHINA, Sept. 19th, 1856.

M. F. MAURY, Esq.: ESTEEMED SIR:—Permit me to mention to you that on my crossing Maclesfield Bank, from Siam, for this place, in the long. of 114° 2′ 30″ E. by chronometer, and in lat. 16° 2′ 28″ N. obs., I found myself shoaled into 5½, 5, and 4½ fathoms very suddenly, immediately after which I then deepened in 10, 12, 16, 20, and 30 fathoms; bottom coral, and one cast red sand. I had at the time very light winds and smooth sea, but I think it must break with fresh breeze and swell on. I feel very confident in saying that I passed over scant 4 fathoms, and beg my fraternity may be duly informed.

I have the honor to be your humble servant and countryman,
CHARLES L. MOSES, Commander H. S. M. ship *Bangkok.*

COAST OF TEXAS.—*Galveston Bar Beacon.*—An iron screw pile foundation, 3 piles at the angles of a triangle, 11 feet on the sides. These piles support a skeleton pyramid surmounted by an iron ball 8 feet diameter, 30 feet above sea-level; the whole painted red.

Light-house bears (magnetic) N. 49° W; Catholic church (magnetic) S. 65° W. The beacon stands in 10 feet water, mean tide.

In running down the coast with it, bearing to northward of W., will carry clear of north breaker.

A buoy, painted black, has been placed inside the bar of Cylinder Channel, Galveston Bay entrance, in 2 fathoms water, the light-vessel bearing from it W. by N.

Coming into this channel from the outside, keep the buoy on with the light-vessel, and run over on that range; pass the buoy on the starboard side, and run for the light-vessel.

Sabine Pass.—A buoy, painted with black and white vertical stripes, has been placed outside of Sabine Bar, in 10 feet water, the light-house bearing from it N.W. by N.

To cross, steer from the buoy N.W., passing Louisiana point, 800 yards on the starboard hand.

Pass Cavallo Bar—A buoy, painted with black and white vertical stripes, has been placed outside of Pass Cavallo Bar, in 4½ fathoms water. The light-house bears from it N. W. by W., and wth the inner and outer buoys from a range.

W. H. STEVENS, Lieut. Corps Engineers, Insp Ninth L. H. District.
Galveston, Texas, Feb. 18 1857.

TRINITY-HOUSE, LONDON, E. C., Feb. 7th, 1857.

Whereas, the buoys and beacons placed by the Corporation of Trinity-House, for the guidance of shipping navigating on various parts of the coast of England, and especially in the channels leading to the port of London, have in repeated instances been negligently or wilfully broken away, or otherwise damaged and rendered unserviceable, by vessels running foul of, or making fast to, and riding by the same; and the *light-vessels* moored off different parts of the coast have also been frequently run on board of, and much damaged, with imminent risk of being broken from their moorings and lost;

And whereas the safety of shipping, and of the lives and property embarked therein, requires that the said *light-vessels*, *buoys*, and *beacons*, should uninterruptedly preserve their respective stations, masters and other persons having charge of vessels are hereby cautioned against the commission of such offences, and are desired to take notice that by "the Merchant Shipping Act, 1854," sec. 414, it is enacted as follows, viz.:

"*Damage to Lights, Buoys, and Beacons.*—If any person wilfully or negligently commits any of the following offences, that is to say:

1. Injures any light-house, or the lights exhibited therein, or any buoy or beacon;

"2. Removes, alters, or destroys any light-ship, buoy, or beacon;

"3. Rides by, makes fast to, or runs foul of any light-ship or buoy;—he shall, in addition to the expenses of making good any damage so occasioned, incur a penalty not exceeding fifty pounds. By order, P. H. Berthon, Secretary.

The foregoing notice to Mariners, received through the Department of State, from the Trinity-House, London, is republished for the information of mariners visiting the coast and ports of England. Thornton A. Jenkins.

Washington, March 20, 1857.

Fixed Light on Cape Caballeria, Mediterranean Sea.—Official information has been received at the office of the Light-house Board, that the Minister of Marine at Madrid has given notice that on and after the 1st day of March next, a light would be established on Cape Caballeria, on the north coast of Minorca, one of the Balearic Islands.

The light is a *fixed white light*. The illuminating apparatus is a catadioptic lens, of the second order. The light is placed at an elevation of 308 English feet above the level of the sea, and should be visible from the deck of a ship, in clear weather, at a distance of twenty miles.

The height of the light-tower, its construction, appearance from seaward, and color, are not stated.

It stands in lat. 40° 5′ 40″ N. long.; 4° 9′ 22″ east from Greenwich.

Thornton A. Jenkins.

Washington. March 27, 1857.

Beacon Tower at Kiu T'oan, Yang-tse-Kiang, China Sea.—Official information has been received at the office of the Light-house Board that the Chinese authorities at Shanghae have given notice that in order to facilitate the navigation of the channel leading up the river Wu-sung, a beacon tower has been erected on the south shore of the Yang-tse-Kiang, at Kiu T'oan, near a spot known as the Three Trees.

The tower is a plain structure of brick, painted red and white, and 70 feet high. It bears from the light-vessel N. 63° W, distance, about 16 miles, and the trees upon Blockhouse Island bear from it N. 15° W., distant 8 miles. It stands in lat. 31° 14′ N., long. 121° 43′ east from Greenwich, nearly.

The light-vessel, painted red, with two masts and balls, is moored in 4½ fathoms at low water, and bears N. by W. ¾ W. from Gutzlaff Island, from which she is distant 23 miles, and 1 mile from the southern edge of the north Tung-sha Bank. [This position differs from that made public in a former notice.]

Ships leaving Gutzlaff Isle, bearing S. by E. 16 miles, should steer a north-westerly course. On making the light-vessel, bearing N.W., they should steer for her so as to pass her as most convenient, taking care, when to the eastward of her, not to bring her to the southward of west, and when to the westward, not to bring her to the southward of E.S.E. ½ S., making due allowance for the setting of the tides over the north bank. When about dipping the hull of the light-vessel, the beacon tower will be seen, and the usual course pointed out in the sailing directions can then be followed.

When a vessel is observed running into danger, a gun is fired from the light-vessel to attract attention, and the signal, by Maryatt's Code, of the course that should be steered, is then exhibited. A ship's signal-lamp is shown on board the light vessel from sunset to sunrise.

(All courses and bearings are magnetic. Var 0° 30′ W. in 1856.)

Thornton A. Jenkins.

Washington, March 27, 1857.

The buoys marking the shoals and dangers in Fisher's Island Sound, N. Y., and the approaches to and in the harbor of New London, Ct., have been replaced in their proper positions.

All the positions of the spindles swept away by the ice in Fisher's Island Sound have been marked with spar buoys, with the exception of Latimer's Reef, where an iron can buoy, painted with red and black horizontal stripes, has been placed.

A. Lt use Insp., 3d Dist.

New-York, April 6, 1857.

Buoys in New-York Bay, &c.—The spar buoys marking the channels across the bar and through the lower bay of New-York, have been removed, and can and nun buoys put in their places for the summer.

Nun buoys mark the "Gedney's" and main ship channels around Southwest spit to the narrows, and can buoys the south channel across the bar and swash channel to main ship channel. A. Ludlow Case, L. H. Inspector, 3d Dist.

New-York, April 10, 1857.

Revolving Light on Cape Moreton, East Coast Australia.—Official information has been received at the office of the Light-house Board that the Colonial government of New South Wales has given notice that on or about the first day of March, 1857, a light would be exhibited in the light-tower recently erected on Cape Moreton, at the north end of Moreton island, on the east coast of Australia.

The light will be a white revolving light, visible once a minute all round the horizon. The illuminating apparatus is catoptric, or by reflectors, and of the first order. The bright face will last 15 seconds, and be followed by an eclipse of 45 seconds' duration. The light will be placed at a height of 385 feet above the mean level of the sea, and should be seen from the deck of a ship, in ordinary weather, at a distance of 26 miles.

The light-tower is of white stone, 67 feet high, including the lantern. It stands on the summit of the Cape, in lat. 27° 2′ 24″ S., long. 153° 28′ 56″ east of Greenwich.

Ships bound to Moreton Bay ought never to mistake Point Lookout, on Stradbroke Island, for Cape Moreton, if they will bear in mind that there is not a building of any description along the coast to seaward from Port Macquarie to Cape Moreton, a distance of nearly 300 miles.

(Variation of the compass, 90° 30′ E. in 1856; increasing about 2′ annually.)

Thornton A. Jenkins.

Washington, April 15, 1857.

A Temporary Light-ship at the Entrance of the Mutlah.—Official information has been received at the office of the Light-house Board, through the Department of State, that a light vessel has been temporarily stationed at the entrance of the river Mutlah, in the following position, viz: in latitude 21° 6′ north, longitude 88° 48′ east, nearly, in 10 fathoms low water spring tides, about seven miles southeast of the outer or Bulcherry Reef Buoy.

2d. This new floating-light will hoist a red flag at the mainmast head by day, and exhibit a clear white light from sunset to sunrise, and in addition to this, she will, if she continues in her position, fire a rocket at 8 p. m., at midnight, and at 4 a. m., from the 15th of March until the 16th of October.

3d. For the present a pilot brig will show the light.

Thornton A. Jenkins.

Washington, April 27, 1857.

Atlantic Ocean, Newfoundland, Light on Green Isle, Catalina Harbor.—The Colonial Government at Newfoundland has given notice that on and after the first day of March, 1857, a light would be exhibited from a lighthouse recently erected on Green Isle, on the south side of the entrance of Catalina harbor, Trinity Bay, on the east coast of Newfoundland.

The light is a fixed white light, and will be visible seaward from the deck of a ship in a favorable state of the atmosphere, at a distance of 8 miles E.N.E. round southerly to S.W.

The lighthouse consists of a keeper's dwelling, of wood, of a story and a half high, with a pitched roof, through the centre of which rises a low stone tower surmounted by a lantern, the height from the base to the top being 32 feet.

About the first day of June next this light, which is temporary, will be replaced by a more powerful light of the same character, the illuminating apparatus being a lens of the fourth order. The light will be placed at a height of 86 feet above the level of the sea, and will be visible through the same arc of the horizon, from E.N.E. round southerly to S.W., for a distance of 15 miles.

Green Isle is in lat. 48° 30′ 45″ N., long. 53° 6′ W. of Greenwich nearly.
All bearings magnetic. Variation 31° 45′ W in 1857, increasing about 5′ annually.

By command of their Lordships,
JOHN WASHINGTON, Hydrographer.

Hydrographic office, Admiralty, London, March 2, 1857.

The following buoys, which were broken adrift by the ice, have been replaced in their proper positions:

Second class nun buoy, on Jack-knife Ledge, painted black, No. 8, with J. K. marked in white.

Second class nun buoy, on Thomas Rock, painted red, No. 4.

Spar buoy, on Perkins' Ledge, painted red in horizontal stripes.

Spar buoy, on Lincolns Ledge, painted red, No. 7.

All the above named buoys mark approaches to the Kennebeck river.

By order of the Light House Board,
GEO. H. PREBLE, L. H. Ins., 1st. Dist.

Portland, Me., March 14, 1857.

BILLINSGATE HARBOR, CAPE COD BAY, MASS.—Notice is hereby given that a temporary stake light will be placed on the south point of Billingsgate Island, one half mile north of the site of the old light.

The stake will be 25 feet high, painted white, and the illuminating apparatus a large lens lantern, showing a fixed white light. It will be exhibited on the night of May 20, and thereafter, until further notice.

A nun buoy, of the third class, painted black and numbered "2," will be placed on the point of Billingsgate Island Shoal in 12 feet water at low tide.

A notice will be published at the time of exhibiting this light, and correct magnetic bearings from this buoy given.

By order of the Light-house Board,
C. H. B. CALDWELL, Light-house Ins. 2d Dist.

Boston, April 27, 1857.

BUOYS ON WEBSTER ROCK, CASCO BAY.—A spar buoy, 35 feet long, painted black, has been placed to mark the rock on which the steamer Daniel Webster struck last October. The rock is two hundred yards distant N. ½ E. of Half-Way Rock, and has eight feet of water over it at low tides. Inside of it there is a channel of from eight to ten fathoms. The buoy is placed about twenty feet N. ½ of the rock, in three fathoms of water at low tide. The following are the magnetic bearings from the rock, viz:

Centre of the Half-Way Rock, S. ½ W.
Mark Isle Monument, N.E. by E.

By order of the Light-house Board,
GEO. H. PREBLE, L. H. Ins., 1st. Dist.

Portland, Me., May 15, 1857.

PENOBSCOT BUOYS.—All the buoys and other day marks marking the Penobscot river and its approaches, are now in proper position, and have been newly painted, agreeably to the printed lists.

By order of the Light-house Board,
GEO. H. PREBLE, L. H Ins., 1st Dist.

Portland, Me., May 15, 1857.

THE buoys marking the dangers in Kill Van Kull, Newark, Princess and Amboy bays, have been replaced in their proper positions.

The positions of the beacons carried away by the ice have been replaced with spar buoys.

By order of the Light-house Board,
A. LUDLOW CASE, L. H. Inspector, 3d Dist.

New-York, May 16, 1857.

OUR STATE ROOM.

U. S. Steamer Michigan on the Lakes.—The British Government has recently complained that the tonnage of this armed vessel is greater than allowed by treaty, which limits the magnitude of such vessels in these waters belonging to the United States or Great Britain to 600 tons. The dimensions of the *Michigan* are: Length, 162 ft. 5 inches—breadth, 27 ft. 2 inches—depth, 13 ft. Tonnage about 604 tons. The *Michigan* is an iron vessel, and renders most efficient service in saving life and property on board stranded vessels. The shipping interests of the Lakes whether American or British could not afford to do without the kindly services of this vessel. To remove the cause of complaint against her size, we propose that her ceiling near the Kelson, be removed, and thicker planks be worked in its place. This will reduce the depth of hold, and thus reduce the tonnage below 600 tons. Only 2, or even 1½ inches less depth of hold, will bring the tonnage within the mark of the treaty. What an absurdity is the present system of tonnage?

Navy Yard at Mare Island.—The United States Navy Yard, at Mare Island, is rapidly growing in importance, and when even one-third of the work projected, shall be completed, it will rank equal in capacity to any yard in the Union. As this harbor is the only safe one on the Pacific, and central in our coast line, very extensive works have been projected, so as to supply the American Navy, in the Pacific, with every species of work necessary, and if required to construct vessels, they can be built with rapidity. Immense quantities of ship-building materials, together with guns, shot, shell, &c., &c., are to be concentrated at the Navy Yard, to be kept on hand for a case of emergency, when, if needed, in from sixty days to four months, several war steamers could be built, armed, and equiped for service. Mr. Hanscom, the naval constructor of the Yard, states that California and Oregon have, in themselves, all the different kinds of timber necessary for ship-building purposes. He has made explorations for the purpose of finding suitable live oak, and found, near Petaluma, superior trees of this species, which will furnish a large quantity of this valuable timber. He has had some cut, and taken to the Yard for examination, and found it equal, if not superior, to that found on the Atlantic coast.

Compasses on Iron Ships.—The Liverpool Compass Committee, formed by the late Dr. Scoresby and others, for the purpose of inquiring into the cause of, and, if possible, providing a remedy for, the extraordinary variations of the compass on board iron ships, has been disbanded. The Liverpool *Courier* says:

"Its decease could not have occurred at a more inopportune time than the present, when naval disasters through 'errors of the compass' are so

rife. We need only instance the cases of the new iron clipper-ships *City of Madras* and *Charlemagne*, lost within the last few days in the Clyde, and worth, with their cargo, upwards up £200,000; of the iron screw steamer *Amelia*, ashore near Milford; of the iron screw steamer *Arcadia*, reported ashore in the Gulf of Smyrna; of the late total wreck of the iron screw steamer *St. Andrew*, on the coast of Syria, and of the complete loss, last week, on the Blackwater Bank, off the Irish coast, of the wooden clipper ship *Emperor*, a few hours after leaving this port for the Brazils."

Iron Ships with Iron Rigging.—The Baltimore papers state that the British iron ship *Santiago* has recently arrived in that city from Africa. She is a clipper of fine model, and besides the hull being of iron, the rigging is mostly composed of wire ropes. The compass is placed on the mizzen topmast, to prevent local attraction, and the top sails can be furled by the men on deck.

Boilers of the U. S. Steamer Merrimac.—The boilers of this vessel—about which so much has been said—are now being subjected to an examination at Boston, while the ship is being overhauled. The tubes being of brass, fears were freely expressed in reference to their wasting away. We have examined them, and find that they hold their diameter both internally and externally, without any perceptible diminish, after having been subjected to the fire for 81 days and 18 hours. Their dimensions are as follows:—Diameter 2 inches, thickness No. 12 wire gage. Length 39 inches, number in the four boilers, 5600.

The Revenue Cutter.—The contract for the construction of the revenue cutter, in accordance with the act of Congress of March 3, 1857, has been awarded by the Secretary of the Treasury to William H. Webb, Esq., of New-York. We have not space for a report of the exhibition of models, which was one of the finest ever seen in the country. We trust that Mr. Webb, and others who may desire to, will furnish us with an abstract of their plans and specifications for publication. It will be well to have the public see some of the excellencies in marine architecture, that were offered at Washington.

How to Talk; A New Pocket Manual of Speaking, Conversation, and Debating—With Directions for acquiring a Grammatical, Easy, and Graceful Style. This book furnishes in a condensed form such an exposition of the whole subject of language as will enable any person of common intelligence, by a little application to study, and a moderato degree of perseverance in practice, to avoid most of the gross errors which mar the speech of a majority of our people, and to use the noble English tongue with correctness and elegance.—Fowlers & Wells, *Publishers*, 308 Broadway, New-York.

THE

U. S. Nautical Magazine,

AND

NAVAL JOURNAL.

Vol. VI.] JULY, 1857. [No. 4.

THE SHIPBUILDERS OF AMERICA.

GEORGE STEERS.

This eminent mechanic was born of English parents in Washington, D. C., in the year 1819. His father was a shipbuilder, remarkable for uprightness and ingenuity, and removed to New-York when George was but four years of age; in this city he brought up his family. He constructed the Marine Railway, commonly called the Dry Dock, for the Company. It was during the time of this construction that young George took his first lessons of usefulness, in the humble office of tending the pitch-kettle. His earliest inclinations were to boat-building, and his first effort consisted in the construction of a flat boat, eight feet long, when but ten years of age. He continued to build boats, chiefly for his own amusement, until he became quite expert in their design and construction, and not less so in their management. At the age of sixteen he built a sailboat 16 feet long, named Martin Van Buren, which beat the Gladiator three miles in a race of twenty-four, at that time exciting no little astonishment. At eighteen years of age he built the row-boat John C. Stevens, thirty feet long, three feet ten inches in breadth, thirteen inches deep, and but one hundred and forty pounds weight; with a full crew on board, the draught of water was only four inches. This boat beat the Unexpected, Sylph, Brooklyn, J. W. Willis, Johnny on the Green, and many other celebrated boats. She was believed to be the lightest and fastest boat of the kind then in the world.

Mr. Steers never served a regular apprenticeship with any one; he left his father at the Dry Dock, and entered the building yard of Mr. Jabez Williams, at about the age of sixteen. An anecdote is related of him here,

that he asked for the job of squaring the wales, the foreman would not trust him to perform it because of his youth and inexperience. George appealed to Mr. Williams, who gave him the job, and it was done to his entire satisfaction. He remained with this builder about eighteen months.

He was next employed by Mr. Wm. Hathorne. This mechanic had the reputation of being one of the most expert draughtsmen in New-York; he used to lay down vessels and make moulds by the job, and with him young Steers applied himself to practical draughting with success. He worked with Mr. Hathorne on several jobs, but it was characteristic of him to remain no longer in one place than was necessary to acquire a knowledge of its mechanical features; when a prospect of advancement, or higher wages, were discovered in another quarter he was off. He would be his own master everywhere, work on the best jobs and with the best mechanics in the city. As soon as he learned how to do a job, he was off to execute it on his own account.

After leaving Mr. Hathorne, we find him and J. Lupton, a most excellent mechanic, laying off in the mould loft the lines of the frigate Kamschatka, built by Wm. H. Brown for the Russian Government. Although not nineteen years of age, he lumped the job of putting in the deck of this ship. In succeeding years he planked several steamboats and steamships for the same builder. With two others, he lumped a ship to build from Isaac Webb. But he was not altogether employed on ships; opportunity was found to build the sail-boat Manhattan, of twenty-seven tons, forty-four feet in length, fourteen feet eight inches breadth, and six feet deep.

In 1843 Mr. Steers entered into partnership with Mr. Hathorne, and built several very fine vessels. Some of them were modelled by the junior and others by the senior partner. At that time Mr. Hathorne was at the head of yacht-building in this country; he done a large portion of work for the Messrs. Stevens, of Hoboken, and was cognizant of all the experimenting done by these pioneers in steamboating and yachting. It would be difficult to define the difference in views of modelling held by Mr. Hathorne and Mr. Steers at this date. Certain it is that they did not adopt the "hollow water line," in any of their fast crafts, although Mr. Hathorne was familiar with R. L. Steven's experiments on the steamboat Columbus about the year 1826. Mr. Stevens employed him to construct false bows, one side being formed with round and the other with hollow water lines. The results seemed to favor the latter, but did not appear conclusive, except, perhaps, for river steamboats.

The steamboat Columbia was the first vessel built by the new firm. We believe it was on this boat that Mr. Steers done one of the greatest

day's works ever performed in New-York. He is said to have fitted and erected forty-five stanchions on the guard, cutting the holes in the oak planksheer, and tenanting them into the facing underneath the beams. The stanchions were of oak, about four inches square, and the day was 10 hours long. They also built a ferry-boat, and constructed for R. L. Stevens an experimental yacht named the "Jim Crack," which proved a failure. It was of deep draught, and the bilge was inverted, or in other words, there were two floors and two bilges, one being above the other, and the upper one twice the breadth of the lower; the great bulk of displacement was thus located amidships, leaving the sides without adequate support; the result was instability. This was a centre-board craft and had an iron trunk casing weighing ten tons, let up into the opening in the keel from below; this served for ballast. The sloop Dolphin was built next, model by Mr. Steers. Then the Jersey City pilot-boat, Wm. G. Haggstaff, was constructed, model by Mr. Hathorne. This boat beat all the pilot-boats of her time, creating no little animosity amongst the New-York pilots against her builders. She was sold and sailed to California, and was finally wrecked at the mouth of the Columbia river. The yachts Cygnet, Syren, and Sybyl were also built, the two former modelled by Mr. Steers. After adding to their constructive labors two gun-boats for the Mexican Government, the partnership was dissolved, when Mr. Steers entered upon the construction of the handsome and fast-sailing schooner "St. Mary," 250 tons burthen. She was sold to the Government of the United States, and bore an armament of two great guns at the bombardment of Vera Cruz.

The services of our builder were next engaged for the construction of a small steamboat for Seneca Lake, in the interior of New-York. He dispatched this job in about six weeks time, and went to Rochester, where he built the lake propellers "Ontario" and "Genesee Chief." The Ontario was in her time one of the fastest of her class; the Genesee Chief, of 450 tons, was built in about 60 days time.

But yacht-building called him back to New-York, where he built for J. M. Waterbury the beautiful "Una;" she was never beaten in a race until her builder produced a boat that accomplished it. The "Cornelia," built for the Yacht Club, was very fast, and gave entire satisfaction. The schooner "St. Mary," (No. 2.) was constructed about this time, and proved remarkable for speed like her predecessor.

In 1848, Mr. Steers was found in the yard of Wm. H. Brown, in the capacity of foreman. He laid down in the mould loft the lines of the steamship "Atlantic," the first of the Collins Line, and assisted in the direction of her building. It afterwards fell to his lot to lay down the ill-fated "...tic," and assist as foreman in her construction.

His next efforts were directed to pilot-boats for his friends of Jersey City, and the "Mary Taylor" leaped from his hands the master-piece of her time. In the model of this boat Mr. Steers adopted a feature which, from its success, he ever afterward gave to all his vessels. The improvement consisted in placing the greatest transverse section and the centre of displacement abaft of mid-length, modeling the sharpest end of the vessel to go forward, with hollow water-lines and the keel rising into the stem, contrary to the hereditary maxims of the craft. Although accredited by some of his friends with the origination of this novelty in marine architecture, we are not aware that Mr. Steers ever claimed it as entirely original with him, but only as being the first to apply it to sailing-vessels. It is said that Lieut. Hunter, of Norfolk, Va., first discussed the propriety of this innovation in New-York, about the year 1844, when Hathorne and Steers were in partnership. At that time both these fast boat-builders contended against Hunter's arguments, and Mr. Steers scouted the idea of "turning the bow inside out," and putting the bowsprit on the long end. Reflection, and perhaps discussion, opened his mind to an appreciating sense of the proposed innovation. These views were not original with Lieut. Hunter, but he adopted them from a knowledge of the experiments in boat building, and the prior investigations of the laws of fluid resistance made by a naval architect, at that date, of Portsmouth, Va., about the year 1840. That the sharpest end of a vessel for high speed should go forward, was discussed in New-York as early as 1843—even before Hunter urged its truth at the yacht-yard of Messrs. Hathorne & Steers. These views were first applied separately to steamboats by Stevens, followed by Thos. Collyer, and Smith & Dimon. At the time of the Mary Taylor's construction, the steamship "Georgia" was building upon precisely similar principles respecting the location of the dead flat frame and the contour of the water-lines. These ideas had even crossed the ocean to England, and one or more yachts had been built on them before the "Mary Taylor" saw salt water. Mr. Steers' adoption of the new features of model and their application to pilot-boats constitutes his claim in the premises. The "Moses H. Grinnell," for the same branch of pilots, followed the unique "Mary Taylor," which was in every respect a model craft. Both these boats gave the highest satisfaction, and they were undoubtedly the first sea-going sail vessels of the new model, which was denominated Mr. Steers'. Upon their type he continued to build without material alteration. In December, 1850, the famous yacht "America," and the "Sylvie" were placed on the stocks. In the month of June, 1851, the America sailed for England, where she beat all her competitors in the celebrated Regatta of all nations, nearly one-third of the distance sailed, which was 60 miles. She was 174 tons—the "Sylvie" 105 tons.

Mr. Steers went over in the "America" and assisted Capt. Brown in sailing the race. Probably two better men to handle a boat and *humor* its performance could not be found in the old world or the new. Mr. Steers could scarcely be beat in any of his boats when he managed them himself. He knew the relative strength of every point involved in the contest, and would stand on a course with helm in hand, and all sail taut as a bolt, when the waves would run over the lee rail and the faces of his deck companions grow white with fear, he feared not—he *knew* the last pound of propelling power which his craft could carry with safety. But he could never manage horses well; with the *reins* in hand he manifested timidity, hence the untimely accident of his horses running away and his leaping from his carriage, causing his death.

The "America" was built for the New-York Yacht Club. The terms were $40,000 for the vessel if she should beat the famous yacht "Maria," owned by Mr. Stevens, and $20,000 if she failed to perform this feat. When Mr. Stevens saw the America in frame he resolved *to lengthen the bow* of the "Maria" 25 feet. She was accordingly hauled out, and Mr. Capes, of Hoboken, fined her anterior extremity, until it even exceeded the sharpness of her new opponent. This trick had not been suspected, and Mr. Steers, relying upon his superiority, engaged in the trial of speed, determined to wring laurels from his opponent under any circumstances. The first trial was rather a drifting than a sailing match, there being no wind. On the second trial, with light airs, the "Maria" kept the lead; they sailed down to Sandy Hook and anchored. On the third day the "America" got under way first, and laid to, waiting for the "Maria." She soon came booming along and passed the America, but on standing out to sea the latter soon gathered speed, under the influence of a fresh breeze, and began to overhaul her opponent; when close on her quarter the foremast head of the "America" carried away. Thus ended the trials. Stevens claimed the victory, and would neither try again nor pay over the money.

After his return from England Mr. Steers built the "Viquero," a propeller for Cuba, the schooner "Pride of the Sea," pilot-boat "George Steers," yachts "Haze," "Ray," and "L'esperance," the steamboat "Velozcavergo," for Cuba, pilot-boat "Anthony B. Neilson," and the yacht "Julia." The "Julia" is now the fastest yacht, perhaps, in the world. She has beaten the "Maria" twice, although not half her size. This vessel, whether from her model or success, is said to have pleased Mr. Steers the best of all his yachts, and latterly he regarded her model as nearest perfect. It is also said that the views of Mr. Waterbury, her owner, were largely embodied in the model; certain it is that this gentleman obligated Mr. Steers to refuse all applications for copies of the lines. Mr. Steers modelled and laid

down the steamboat "Queen of the West," built by Bidwell & Banta, at Buffalo. Though a very fast boat, her draught was not so light as was expected. The ship "Sunny South" was the next vessel, and his first construction of this rig. She was very fast, but was over-sparred, in consequence of the Captain having ordered the lower masts about five feet longer than the draft.

In 1854, Congress having ordered the construction of six war steamers, Mr. Steers, as well as a few other builders, desired to construct one or more of them by contract. It was decided to allow but one constructed by a marine builder, and Mr. Steers proposed to build one in the Brooklyn Navy Yard. Government generally repudiating the contract system of building naval vessels, this proposition was accepted by the Secretary of the navy, and Mr. Steers was appointed a naval constructor to build the frigate Niagara. With the exception of the auxiliary steam-power, quality of canvass, ground tackle, and a few unimportant things, he was allowed to exercise his own judgment, both in the model and manner of construction. He appreciated the importance of his position, and assumed it with full knowledge of its great responsibility. The success of this ship, which has been fully described in preceding numbers of this Magazine, will probably determine the eligibility of merchant shipbuilders for constructors of war vessels, although we know of no reason why its demonstration should be confined to but one ship and one model. The construction of this vessel tasked the ingenuity of her builder beyond that of any previous effort. His workmen were the best to be found in New-York, and the mechanical skill of this city neither has, nor requires, a better monument upon the ocean than the frigate Niagara. In the construction of this ship Mr. Steers introduced the plan of strapping the frames on the outside, and in a similar manner the strapping of decks upon the upper surface of the beams. The taffrail, of circular form, was built on the ground of six inch planks, bent to position and bolted together; it was, perhaps, the first of the kind. The precautions adopted to prepare the ship for launching have been fully described in previous numbers, and we will merely advert to them here. He was very anxious to make a successful launch, and like a true mechanic devised the mechanical means for its accomplishment. He stood on the end of the dock, and, it is said, fairly leaped from the ground in his exultation, as the beautiful and majestic fabric glided into her element without an accident or an interruption of any kind.

Soon after the Niagara was begun, the last yacht from the building-yard of George Steers was launched, and named the "Widgeon;" she has not yet distinguished herself in the regattas. The next and last great work of our subject was the construction of the Collins steamer "Adriatic," at the foot of Seventh street, New-York.

GEORGE STEERS.

In building this ship, his eldest brother, James R. Steers, Esq., was united with him in partnership, under the firm of George and James R. Steers—the latter having the active charge of the yard. This ship will be described in future numbers of this Magazine, after she shall have made a performance to test her qualities. She was launched on the 7th of April, 1856, and her machinery is not yet completed. The views of Mr. Collins were largely entertained in the model of the Adriatic—as a consequence no small share of responsibility for her future belongs to him. Mr. Steers has said that $10,000 would have been no object with him to have had a

free hand on her model. He entertained ideas with reference to speed, in crossing the Atlantic, altogether too far advanced for capitalists, as what *live* architect does not? The launch of the Adriatic was another and the last of those proud triumphs of our builder, in which the success of years seems concentrated in a single hour. The crowd in attendance at the launch was greater than ever before known on any similar occasion in the United States. It is estimated that as many as 60,000 persons beheld it from all quarters affording a view. The Adriatic is the largest ship ever built in the United States, being 354 feet long on deck, 50 feet extreme breadth, 32 feet 10 inches depth, and about 5,900 tons carpenter's measurement. Owing to the symmetry of model, her immense size is scarcely appreciated by the beholder.

Beyond any other mechanical trait, Mr. Steers was distinguished for the excellence of his workmanship. In the construction of some of his yachts he planed the frames outside and inside, after fairing them with the adze. In dubbing for plank he would sometimes plane his line on the timbers to get off all the lumps. He would have the most perfect joints made everywhere throughout the ship. It was his custom with yachts, after squaring and planing the outside, to paint it, then observe the unfair spots, which he would have scraped and planed again. He used to denominate inequalities of surface "horns," and sought to secure a very fair, smooth exterior to the bottom of his swift vessels. Indeed, great pains were taken with every part—he aimed to make the fabric as fine as the model itself. He was never afraid of a new idea, and possessed himself of all that came before him. Ambition and confidence in his abilities was joined, in character, to a manly modesty, and while he would shrink from no measure of mechanical responsibility, he seldom made known his views. He had no taste for discussion, but depended on his friends and his works to speak for him. He was large in stature, very robust, cheerful, generous, and wholly devoted to his favorite pursuit. He totally disregarded the cost when the best was to be produced, and an indifferent job had no attractions whatever for him. He cared not to make money at shipbuilding, and saved very little of his immense earnings, being better pleased with a perfect job than a wide margin of profits. His price was at the highest mark, consequently he always failed to get work which was to be let to the lowest bidder. Perhaps the Adriatic was the only ship which he built at a price below the value in consequence of the competition of another bidder, but this ship he had resolved to build, while it was the intention of the owners to give him the preference. We doubt if a model ever commanded a higher price than he received for that of a yacht made for an American House in China, in 1854—the amount was $1,000.

George Steers was not the single representative of American genius in

shipbuilding. He stood conspicuous for his intuitive mechanical talent, yet it was on this alone, mainly, that he relied for success. He felt his way in channels where others were pilots, and learned his *modicum* of science in the school of experience. Where he had most practice he accomplished most, and this was in the construction of yachts. He will be known as the yacht-builder of America when all else about him shall have been forgotton. The "Mary Taylor" was to him a text-book in every subsequent model. The huge frigate Niagara is but an expansion of the model "pilot-boat" set to the given dimensions. The Adriatic is the only vessel he ever built without dead rise at the greatest transverse section, and is herein an exception to his rule. He has demonstrated, what common sense must conceive to be true, that the principles involved in a successful pilot boat are applicable to the model of the largest ship—that enlargement of dimensions does not require changes in types of model.

Such was George Steers. A self-made mechanic, of more solid worth to the nation and mankind than legions of titled heroes and monied nabobs. At the early age of thirty-seven, with the career that we have sketched, he had but entered the vestibule of his usefulness and fame; his sudden and violent death was a calamity to the country and a loss to the world. What he would have done in the course of the long life that seemed promised to him is now sealed up in the mysteries of the grave. Let his living compeers go forward with the tasks that would otherwise have been shared by him; and we commend all to the emulation of that noble spirit of generosity which never refused, when untrammelled by pledges to owners, to afford the public, and his brethren of the profession, the gratification of seeing the lines of his most successful models. The drawings of the Mary Taylor, Moses H. Grinnell, America, and Sylva, were published soon after being built in Griffith's *Marine and Naval Architecture, and Shipbuilders' Manual.* Long before his death he placed in the hands of the Editors of this Magazine the lines and spar draft of the frigate Niagara for publication. We have now given them to the world. With the true magnanimity of genius, he scorned to hide his lamp, and never allowed it to bear a flame of which he could be ashamed. All honor to his memory.

SUMMARY OF ABSTRACTS OF THE STEAM LOGS OF THE U. S. STEAMER SUSQUEHANNA.

ABSTRACT OF LOGS FROM JUNE 1ST, 1851, TO MARCH 31ST, 1855, WITH OLD BOILERS—(FLUES).

Total Time.		*Steam alone*		*Stm. & Sail.*		*Sail alone.*		*Average pressure of steam*	*Average revolu'n pr. min.*	*Average speed pr hour.*	*Average Coal pr hour.*	*Total Coal consum'd.*	*Total Distance run.*	*Distance with Sail alone.*	*Distance with Steam alone and Steam & Sail.*
days.	*hrs.*	*days.*	*hrs.*	*days.*	*hrs.*	*days.*	*hrs.*	*Pounds.*		*Knots.*	*Pounds.*	*Tons.*			
337	5	194	2	131	4	11	23	9. 1	10	7.25	3,362	11,000	61,129	2,251	58,878

ABSTRACT OF LOGS FROM MAY 1ST TO SEPT. 30TH, 1856, WITH NEW BOILERS—(VERTICAL TUBES).

Total Time.		*Steam alone*		*Stm. & Sail.*		*Sail alone.*		*Average pressure of steam*	*Average revolu'n pr. min.*	*Average speed pr hour.*	*Average Coal pr hour.*	*Total Coal consum'd.*	*Total Distance run.*	*Distance with Sail alone.*	*Distance with Steam alone and Steam & Sail.*
FROM MAY 1ST TO JULY 31ST.															
44	15	29	14	15	1			11. 4	11. 3	8. 3	2,595	1,404	8,715		8,715
FROM AUGUST 5TH TO SEPTEMBER 30TH, FRIGATE "CONGRESS" IN TOW.															
8	4	8	4					11. 2	11	6. 5	2,860	318	1,248		1,248
TOTAL AVERAGE WITH NEW BOILERS.															
52	19	37	18	15	1			11.35	11.25	8	2,752	1,722	9,963		9,963

By reducing these abstracts to one common standard of speed by means of the ordinary rules applied for that purpose, with the view of obtaining the relative economy of fuel, and by taking the "Logs" of the ship with the "old boilers" as the basis of calculation—having reference to speed and coal—we obtain the following comparative results:

The performance of the ship under ordinary circumstances, with the ship alone, is found to be as 100: 182, or 45 per centum in favor of the new boilers. With the Frigate "Congress" in tow it was as 100: 87 or an expenditure of only 13 per cent. more fuel, whilst the ship was performing double duty.

A general mean of performance with new boilers is as 100: 134 or 25 per cent. in their favor under all circumstances, including time of towing, &c.

THE ENGINEERS OF THE AMERICAN AND BRITISH NAVIES.

With the increase of our steam navy a demand for engineers will spring up, and the public will desire to know what are the regulations for the admission and promotion of this class of officers in the United States service. We propose to examine the systems of our own country and Great Britain.

In the United States Navy there are four grades of Engineers, viz: *Chief* Engineers, and *First*, *Second*, and *Third Assistants*. Before persons can be appointed Assistant Engineers, they must have passed a satisfactory examination by a Board of at least three Engineers, appointed by the Secretary of the Navy, and produce evidence of good character, habits, and health. To enter the grade of *Third Assistants*, the candidate must be able to describe all the parts of common condensing and non-condensing engines, and explain their uses and mechanical operation. He must explain the mode of operating engines, of regulating their action, and of guarding against danger from the boilers by the usual means applied. His educational acquirements must extend to fair penmanship, common arithmetic, and the mensuration of surfaces and solids of the regular forms —age from eighteen to twenty-six years.

For promotion to the rank of *Second Assistants*, the candidate must have served at least two years in the lower grade in the management of steam engines, must produce testimonials of good conduct from the Commanders and senior Engineers of the vessels in which he may have served; and in addition to the examination on admission, he will be required to explain the different kinds of valves and the manner of their operation; he must have a knowledge of the causes and remedies for foaming in boilers, and of derangement in the operation of air-pumps, force-pumps and feed-pipes, and also of cleaning boilers. A general knowledge of the mensuration of surfaces and solids will be required.

To the grade of *First Assistants* candidates cannot be admitted before serving three years in actual service as Second Assistants; and on examination they must produce testimonials as before, and, recapitulating the former tests of proficiency, advance to an explanation of the mechanical powers, the general principles of the operation of the steam engine, the causes of deposites and incrustations in boilers, and the best means of removing them, and be able to draw working sketches of different parts of engines and boilers; to superintend their construction and determine upon their workmanship and utility.

-- promotion to the rank of *Chief Engineer* can be obtained, the have served for two years as First Assistant in actual sea-

service, and pass examination on any of the subjects before specified; he must also satisfy the Board of previous good conduct; of his sufficient knowledge of Mechanics and Natural Philosophy; of the forms, arrangements, and principles of different kinds of steam engines, boilers, propellers, and their various dependencies which have been successfully applied, and their alleged relative advantages, for sea or river service; and have attained twenty-six years of age.

Candidates for promotion who may fail to pass a satisfactory first examination may be re-examined, when, if failing to pass, they are dropped from the list of Engineers. Practical evidence of efficiency is required at all the examinations. The relative qualifications of promoted Engineers are noted by the Board, the best qualified being assigned the lowest number.

Examinations for admission or promotion are ordered at the discretion of the Navy Department. Should the wants of the service require the admission of Engineers of any grade above that of Third Assistant, the same qualifications and restrictions as to times of service will be exacted as are required for regular promotion to the rank in question, provided that all appointments to the grade of Second Assistant shall be made of persons between the ages of twenty-one and twenty-eight; and to that of First Assistant, between twenty-five and thirty-two; and to that of Chief Engineer, between twenty-eight and thirty-five.

The Assistants must embrace all opportunities to acquire a thorough practical knowledge of the fabrication of different parts of steam engines and their dependencies, that they may be able to make repairs on shipboard when required. When other qualifications are equal, candidates whose skill in these particulars is superior, have precedence for admission or promotion.

Thus, by a regular course of promotion, the responsible office of Chief Engineer can only be reached after seven years actual service, which will require from ten to twelve years from the date of admission to perform. We think the time of service rather too long—time is an inferior qualification in comparison with talent, and routine goes oftener with mediocrity than without it. Why not promote a candidate, if of suitable age, on the sole ground of merit? But the rules above are at least fair, and seem well calculated to secure a reasonable proportion of skill and science in the Engineer corps of the U. S. Navy. The usages of the American service are altogether superior to those of the British. We hear of no such complaints as those contained in the following remarks from the *London Artizan*, on the Engineers of the Royal Navy:—

"The great increase which has taken place in the Steam Navy has created a demand for engineers, and the question naturally arises, are we getting the right material—men who, from their skill and experience, are thoroughly capable of taking charge of the machinery, and of performing the responsible and arduous duties of engineers at sea. We can safely reply in the negative; and that it is due to the disagreeable and anomalous position in which engineers in the Royal Navy are placed, that few men, practically qualified from their previous services in the mercantile steam marine, can be induced to volunteer for the Royal Navy. Amongst many grievances of which the Navy engineers justly complain, we will endeavor to find space for those which deserve our most serious and immediate attention, for it is a subject of national importance that the Admiralty should be always able to command the services of the best sea-going engineers.

First,—with regard to *pay*. Chief engineers in the Navy, though having a great responsibility as to the machinery, coals, stores, &c., receive 50 per cent. less per annum than the pay given in any respectable steam shipping company, at the same time their expenses of mess, and in other particulars are very much greater. There are *three* different classes of *chief* engineers, and the third class only receive £14 a month. On reference to the 'Navy List' it will be found that the bulk of the Engineers belong to this class; thus the Admiralty are getting the duty performed for a sum much below, as before stated, that paid in any respectable merchant steam company. Chief engineers have no increase of pay with service, the same as doctors and others. As to assistant engineers, their names are not at all in the 'Navy List,' not even those of first assistants; again, they are not allowed *cabins* on board the ships; and with regard to their pay our readers may infer, that if chief engineers are so ill-paid and treated, assistants are not any better off. We are informed that, last year, locomotive drivers were entered into the service and allowed to wear the uniform, and received £2 a month more pay than a third-class chief engineer; but we believe the Admiralty have given them up, and are at present entering *mere lads*, who are to be *taught* their duty by the chief engineers and first assistants:

Second,—chief engineers in the Navy are only allowed the full-dress uniform of a *carpenter*—the same coat, with a trifling difference of button; and, with the exception of his own assistants, the chief engineer is the only officer on board who does not wear a sword, yet he ranks nominally with a master.

Third,—engineers are not allowed to go on half-pay, the same as other officers, but are placed on what is called the "Steam Reserve," which means that they must live near some dockyard and report themselves twice a-day.

Fourth,—there is no retirement at all established for engineers.

It will be seen by the above that the grievances of the engineers in the Royal Navy are not light ones, and as their requests are moderate, namely, not so much an increase of pay as to be placed on an equality as to uniform, half-pay, and retirement with those officers with whom they rank, and, in addition, that there should be only one class of chief engineers, with increase of pay according to the length of services. It is notorious that there is a sad want of good sea-going engineers in the Navy, and it will be obvious to our readers to what causes it is to be attributed. We would earnestly draw the attention of the Admiralty authorities to the fact that the employment of unqualified and unpractised persons in the engine-rooms of our vessels of war, will add a serious item to the annual expenses in the shape of the deterioration of the machinery, and we trust that this department will be so remodelled as to render it the ambition of every marine engineer in the merchant service to enter the Royal Navy."

Let our own government consider if any improvement in the regulations of admission, promotion, wages, rank, &c., would make the Navy more attractive than it may be at present for men of sterling worth. We are now ahead of the British Admiralty in the employment of naval skill and talent, and with the increase which we hope is soon to be made to our steam Navy, we trust our advantage will be fully maintained.

The number of Engineers now in the Navy is ninety-six, divided between the several grades as follows: Chief Engineers, 17; First Assistants, 24; Second Assistants, 20; Third Assistants, 35. The pay of Chief Engineers, per annum, first five years, $1,500; if on leave, or waiting orders, only $1,200 is allowed; First Assistants get $1,000, and if on leave or waiting orders, $850; Second Assistants receive $800, and $600 if not in actual service; and Third Assistants are paid $600 for duty, but only $400 for off duty time. After five years service, Chief Engineers receive $2,000 for sea or other duty, and $1,400 when not actively employed.

NEW-YORK HARBOR ENCROACHMENTS.

Since the appointment of Commissioners to define the exterior line of the harbor of New-York, the river-bounded districts of this commercial community have been kept in a continued state of excitement. It is not a matter which challenges the assignment of reasons for the appointment of a commission—the necessity was obvious. But however willing, the Legislature cannot escape the public inquiry—"Why the appointment of a commission composed of incompetent or interested men?" With the several reports of the Commission before us, we are led to believe that these gentlemen knew but little, if indeed anything, of the bearings or soundings of New-York harbor, except those water-rights in which some of the members were interested, and it is equally manifest that they had less capacity or disposition to learn the effect of tidal force, when brought to bear upon the shoals of navigable rivers. The selection of a Commission for so important and practical a purpose, purely on political grounds, is, to say the least of it, highly discreditable to the Empire State, and would long since have met with a signal rebuke, could an independent press have been brought to bear upon their doings; but having taken time by the forelock, they wisely called upon the herculean arm of the general government to do the service for which they were appointed. By this stroke of policy they were enabled to accomplish a two-fold purpose, viz: first, of making the Superintendent and officers of the Coast Survey responsible for the

tenor of their counsel, and second, of screening their own inefficiency from the glare of public opinion. Without the timely assistance of an advisory council, consisting of General Totten, Professor Bache, and Captain Davis, the whole measure would have proved to be the greatest farce of modern times. It was not to be expected that these gentlemen should consult the rights of riparian owners under former legislative enactments, particularly that of 1837; it was not to be regarded as a part of their province to define the boundary line of rights between the State and its citizens, nor was it a part of their duty to inquire to what extent the State had become responsible for the preservation inviolable of its plighted faith to its citizens, when vesting in the elective franchise of the city the right of the Common Council, as by the Acts of 1837, to sell and give warrantee deeds for land bounded by water fronts in common with real estate located elsewhere. But for this special provision which the Commissioners seem unable to understand, no person could have been induced to purchase property from the city, more particularly such property as became directly or remotely riparian. The community had not only unshaken confidence in the enactments of 1837, especially made as a guarantee against any and all subsequent acts, by which they might by any means be deprived of their rights without indemnification, for which both the State and the City had held out inducements to find purchasers—but they had the authority of common law made doubly clear by the first jurists of the age, in reference to annulling those rights made binding by the Legislative arm. If the Commission were incompetent to determine cause from effect in the science of hydrography, they should at least have been equal to the task of estimating the injury to be sustained, and the amount of damages to be awarded as indemnification to those who have been thus wantonly deprived of vested rights. The first business in order with the most influential members of the Commission was to protect the Gas Works extension, the Ruggles and the Lober bulkhead, as also certain waters in Gowanus Bay; these cared for it seems to have given the Commission little concern in reference to the rights of others. Without the least reference to locality, the Commission determined that the owners of wharves should be compelled to dredge the slips at their own expense, notwithstanding the necessity for dredging is caused by the sewerage of the city. It requires but a glance at the different elevations of the streets of the city to discover that large river districts are made the cesspool of those parts having more eligible and favorable altitudes. For example: all that margin of river bounded by Grand street on the south and 25th street on the north, receives the drainage of those parts of the city east of Broadway. As well might the City Fathers demand of the riparian owners that they should clean the streets and remove the dirt collected in

this entire district, as to insist that that portion which is washed into the sewers and conveyed into the slips shall be removed by them. But such measures, however absurd they may appear, are but in keeping with the doings of this Commission in other respects. After having, as they doubtless supposed, taken care of themselves and saddled the responsibility of the exterior line on the advisory council, they then turned their attention to the government of wharves. The following extract from their Report to the Legislature, bearing date of January 29th, 1856, reads thus: "Impressed with the expediency, as well as the justice of satisfying the fair claims of the wharf owners, they have endeavored to frame such regulations for the government of wharves as will secure for their owners and lessees an ample revenue, without the imposition of taxes on the transit of merchandize over the wharves, or adding to the present wharf rates of vessels." How considerate! We are mistaken if even the superficial observer is not able to see through this flimsy gauze, and look beneath the surface, and see the *Corlears*, *Lober*, Ruggles and Brooklyn Gas wharf extensions so far beyond the effects of sewerage as to be out of harm's way; and while they would make the riparian owners the city scavengers, they would so contract the exterior line as to enhance the value of their own property, because free from those burdens and at the same time not only deprive their neighbors of that which they have purchased and hold warrantee deeds for, but deprive them still farther of their rights, by depreciating the value of the property in question, and all this without one word about indemnification to the sufferers. Perhaps they supposed that the sewerage deposits would furnish the "ample revenue" referred to in their report, and that the owners and lessees should secure that "ample revenue" by dredging for it. But if this is not enough to settle the question of incapacity on the part of the Commissioners, we have other evidence furnished by their acts. In their report to the Legislature of January 8th, 1856, and again on the 29th of January, 1857, they call the attention of that body to the fact that the East River between Corlear's Hook and Eighteenth street, "the riparian owners have filled in beyond the cession of four hundred feet to the city, and beyond the exterior street established by the Legislature in 1807, a distance of twenty-four hundred feet;" and again referring to the subject, they call especial attention to the bulk-head between Thirteenth and Eighteenth streets, well known as the Lober bulkhead, to its injurious eff ct on the harbor by the disturbance of currents, and to its construction in direct violation of law, showing the necessity (doubtless by the aid of their advisory council) of its partial removal or its entire demolition; yet, notwithstanding their solemn convictions based upon the better judgment of the Coast Survey, they are content to allow this protuberating structure to remain within their exterior line of extension, while

advised by a board of scientific men, that such obstructions were the immediate cause of shoaling the waters between the protuberating points; no man who has been conversant with the direction of the tidal course of the East River for the last 25 years can be ignorant of this fact in the history of its soundings. It is notorious that beneath the waters where the first of the Collins line of steamers (the Atlantic) was launched into her destined element, the waters since that date have shoaled to but little more than half of their former depth; and it is a truism with which hydrographers are conversant, that any abrupt points in a river, whether its waters be moved by the influence of currents or by tidal force, is the immediate cause of counter currents, and counter or eddy tides, in the recesses between these abrupt projections. Since the extension of those bulkheads and piers of which Tompkins and East streets are formed, the waters have gradually shoaled along the shore above Corlear's Hook, and the depth has been diminished much more rapidly since the Lober extension. The eddy tide has been so strong between those points, both on the ebb and flood tides, that vessels seek the western shore when the tide is adverse to their course in the channel, and will often run the hazard of grounding on the shoals for the advantage of the eddy tide, which, as every scientific hydrographer well knows, is wholly the result of obstructions, either natural or artificial. The only consistent course, in view of the injury inflicted upon the commercial interests of the city by permitting these encroachments, would have been to have marked out an exterior line between those impinging points, that would cause an equalization of the impinging force of the channel waters on both the ebb and flood tides with the outer margin of the eddy tides.

Nor is this the only part of the Harbor in which the imbecility of the Commission is made manifest; the recommendation in their first report to convert the cove bounded by 18th street and the Lober bulkhead into a wet basin for the accommodation of vessels, must at once strike every sensible man as a decision without forethought, and having no basis in a knowledge of the geography of Manhattan Island. This cove has, for the last thirty years been the depository of all the filth and drainage of a very large district, being the immediate terminus of a gullied section of the city, and if thus disposed of would very soon become a dry basin instead of a wet one; the shoaling of the waters of this cove have been gradual and steady, and must continue, unless constantly dredged, until filled up and the curvature of the river's margin is such as to equalize the impinging tidal force along the shore. How unwise, then, would be that policy which would select such site for the wet basins as first recommended by the Comm

s encroachments upon the Harbor, the advisory coun-

cil furnish abundant proof that the course pursued is neither based on scientific principles, nor yet on those common rules of observation which determine effects, though the causes be hid in the principles of philosophy and are interwoven with the laws of science.

From the able report of the advisory council, bearing date of December, 1855, we quote a few of the closing paragraphs embraced in their general remarks, showing at a glance the true principles of harbor preservation. Had these admonitions been duly respected, the exterior line on both the East and North rivers would have been in the strictest accordance, not only with the rights of riparian owners, but with the great commercial interests of the city.

"The point which has suffered most from encroachments, is the 'reach' of the East River between Fulton Ferries, the Navy Yard and Corlear's Hook. The greatest velocity of the tide stream is at the second quarter of the flood, when it reaches a maximum of 422 feet per minute, or 4.8 miles per hour, which has an average duration of fifty minutes. The mean of this quarter of the flood and the same periods of the ebb is 4.3 m. and 4.0 m. per hour. The means of the first and fourth quarters are, of course, less. In order to appreciate these numbers, we will compare New-York Harbor with the Thames. Between Southwark and New London bridges, the greatest velocity of the tidal current is 343 per minute, or 3,903 miles per hour on the quickest ebb. This measurement was made in 1833, two years previously, that is, before the masonry and starlings of the old London bridge had been removed, the velocity on the quickest ebb was 489 feet per minute, or 5.560 miles per hour* In the same place on the flood the velocity is 287 feet per minute, or 3.264 miles per hour. In 1831 it was 3.777 miles per hour.

The present average velocities of the river Thames, between Southwark and New-London bridges, are on

The first of flood,	1.779	miles per hour.
The last "	2.891	"
The first of ebb,	3.609	"
The last of ebb,	3,263	"

We have taken in the Thames, as in our own rivers, the places where the tide is most rapid in its flow, and we have kept our inquiries simply to velocity, that being the only element in question.

By this comparison we learn that the average velocity of the tidal current in the narrowest channel does not much exceed that of the port of London; that there is, however, a period of fifty minutes duration, during which the velocity is considerably greater; but that this period is really so brief that, even if the current were stronger, it would hardly present any serious—anything more than a temporary—obstruction to business.

The navigation of the North and East rivers is incommoded somewhat by the velocity of the current, but it is still open and free. And in the progressive march of improvements, the employment of steam ferry boats as the almost universal means of individual transit, and of steam-tugs and tow-boats for the movement of vessels, has reduced this inconvenience to its minimum.

* While the rapidity of the current was diminished in this particular place by the rem of the old London bridge, its rate was in general increased throughout the river below.

And we are now to look at the other view of the subject, and to take into account the benefits arising from this rapidity of the tidal stream.

'*The secret*,' says Fazio, in his work, SUR LE MEILLEUR SYSTEME DE CONSTRUCTION DES PORTS (translated from the Italian by M. Lemoyne,) '*of preserving the depth of the waters in harbors is always the same: it consists less in diminishing than in increasing the strength of the currents*.' (The italics are the author's.) In this very velocity of the tide stream in New-York harbor we have the most perfect security for the maintenance of the channel in a permanent state of usefulness. Thus much we say in passing, to quiet any apprehensions as to the preservation of the harbor, that may have been diffused by the very earnest remonstrances and appeals from the highest sources against further encroachments.

A common sense view of the subject, enlightened by the wisdom of scientific knowledge, and corroborated by the experience of years of observation, would have dictated an entirely different policy in reference to the increasing wants of the city for shipping accommodations. Such an investigation, by a commission of disinterested men, would have shown that instead of *filling out still farther on the rounding shore, contrary to the dictates of reason, philosophy, and science*, they would have insisted on trimming off those protuberating obstructions, allowing the tidal course to point out nature's unerring law of equilibrium, equalizing the force of the tide, and preventing eddies by making the shore of such formation as would cause the tide to follow its gentle curve, removing in a great measure the necessity for dredging.

ANOTHER SEARCH FOR SIR JOHN FRANKLIN.

A VERY strong screw steamer is now on the docks at Aberdeen, Scotland, fitting up to make a last effort in the search of the lost Arctic navigators, Sir John Franklin and his crew. The vessel is built on the diagonal principle, and is getting a doubling of African teak, between which and the outer planking there is a thick covering of felt. She measures 132 feet of extreme length, 25 feet of extreme breadth, with a depth of hold of 13 feet, and a draught of water of 11 feet. The screw is being fitted with lifting gear, and the engines are of a very powerful character. The work is so far advanced that she will be ready for sea by the beginning of July. She will have a crew of thirty men and officers, most of them volunteers. They will be chiefly from the north of Scotland, and well accustomed to the hardships of an Arctic voyage. The commander is Capt. McClintock, an old Arctic navigator, he having served under Capts. Ross and Austin.

This expedition appears to us to be fool-hardy, but Lady Franklin has sold [illegible] which she had in Australia to fit out the expedition, and the [illegible] enthusiastic that he will be successful and bring home some [illegible]nts of the lost vessels, *Erebus* and *Terror*, belonging to F[illegible] —*Sci. Am.*

ABSTRACT OF LOG OF SHIP "ROMANCE OF THE SEA," W. W. HENRY, COMMANDER, FROM SAN FRANCISCO TO SHANGHAE.

Date. 1856.	Lat. N.	Long. W.	Course.	Dist.	WINDS. 1st part	2d part.	3d part.	REMARKS.
Nov. 19	36° 46′	124° 40′	S 62° W	124	South	Calm	W N W	Nov. 18, 8, A. M., civil time, discharged pilot off the heads. Middle part calm, ends moderate and foggy.
" 20	33 45	128 45	S 48 W	270	N W	N W	N W	Moderate and pleasant.
" 21	32 24	131 14	S 57 W	149	N N E	N E	N N W	Light, moderate, and pleasant.
" 22	28 28	134 55	S 45 W	302	N W	W N W	W	Moderate, latter part fresh. All sail set.
" 23	27 15	137 17	S 60 W	140	N W	N W	N W	Light, and fine weather.
" 24	26 08	140 07	S 66 W	167	N W	N	N E	" " "
" 25	25 32	143 31	S 79 W	188	N E	E	E N E	Moderate and cloudy.
" 26	24 21	147 41	S 78 W	238	E N E	E	E	" and squally.
" 27	23 00	152 19	S 72 W	268	E by N	E	E by S	" "
" 28	22 10	157 30	S 79 W	290	E S E	E	E N E	" Latter part fresh
" 29	21 10	159 32	S 62 W	129	E S E	E	S E	Light winds and pleasant, at 4, P. M., north Point of Whoahoo, bore S. S. E. 10 miles. Middle and latter part very light.
" 30	19 56	162 01	S 62 W	158	S E	N N W	N E	Commences light winds. At 4, P. M., wind hauled N.N.W. Latter part, light winds from N.E. and pleasant.
Dec. 1	19 11	165 04	S 75 W	179	E S E	E S E	S S E	Light winds and squally.
" 2	18 26	168 04	S 75 W	176	S S E	E	N E	Light winds—ends moderate.
" 3	18 28	172 37	W	260	N E	N N E	N N E	Moderate and pleasant.
" 4	18 24	177 15 W.	W	264	N N E	N N E	N E	" "
" 6	18 38	178 20 E.	N 87 W	252	N E	N E	N E	" "
								Day and date changed in consequence of going from West into East Longitude. Ends moderate.
" 7	19 06	174 07	N 88 W	241	E N E	N E	N N E	Light winds and pleasant.
" 8	19 07	169 54	W	239	N E	N	N N E	" "
" 9	19 28	165 23	N 86 W	257	E N E	N	N N E	" "
	19 50	161 05	N 85 W	245	N E	N E	N E	" "

ABSTRACT OF LOG OF SHIP "ROMANCE OF THE SEA," W. W. HENRY, COMMANDER, FROM SAN FRANCISCO TO SHANGHÆ.

Date. 1856.	Lat. N.	Long E.	Course.	Dist.	WINDS. 1st part.	2d part.	3d part.	REMARKS.
Dec. 11	20 10	157 20	N 85 W	212	E N E	E N E	E N E	Light winds and pleasant.
" 12	20 26	153 24	N 86 W	222	E N E	N E	N E	" "
" 13	20 56	149 44	N 82 W	208	E N E	E	N E	" "
" 14	21 15	146 36	N 83 W	175	N E	E	E	" "
" 15	22 30	142 06	N 73 W	261	E N E	N E	N N E	Light winds, middle part fresh and squally, ends moderate.
" 16	23 28	138 08	N 75 W	226	N N E	N N E	N N E	Light winds and pleasant.
" 17	23 22	136 19	S 87 W	101	N N W	N N W	N N W	" "
" 18	23 45	133 47	N 82 W	141	N N W	N	N N E	" "
" 19	24 20	132 11	N 68 W	89	N E	S E	S W	" "
" 20	25 45	128 23	N 67 W	215	W	N N E	N	Light winds. A 10, P. M., wind hauled suddenly to N. N. E., in a squall. Took in skysail and royal studding sails for the first time since leaving port. Ends squally.
" 21	27 36	124 43	N 59 W	228	N N E	N N E	N N E	Fresh and squally. Rough head sea at 3, P M. Loo Choo Islands north 15 miles.
" 22	30 03	122 54	N 33 W	175	N E	E N E	E N E	Moderate and pleasant daylight. Island of Video west 10 miles.
" 23					E	S E	N N W	Light winds. At 7, P. M., passed Saddle Islands Middle part rainy. At 7, A. M., wind hauled to north-west. At 10, A. M., made the light ship. At 12, noon, anchored off the light ship, wind and tide ahead—34 days and 4 hours passage. Took a pilot to take the ship to Shanghæ.

IRON SHIP KNEES.—A regulation of the committee of Lloyd's Register comes into force on January 1, 1858, to the effect that ships which proceed to sea without being fastened with iron knees and riders prescribed by the rules, will have one year deducted from the period to which they would otherwise be entitled to be classed in the registry books.

LIEUTENANT STRAIN.

By the death of Lieut. Strain, in Aspinwall on the 15th ult., the U. S. Navy has lost one of its most accomplished officers—one of the few who, amid the demands of an engrossing profession, found time to cultivate literary tastes to an extent unusual among purely literary men. To a practical experience rarely found among persons of the world, he joined a mind carefully disciplined by self-culture. Few countries had been left unvisited, and he died planning an exploring voyage in the Malayan Archipelago. This had been for a long time a favorite project, and while there, some ten years back, he had devoted no little labor to the acquisition of the Malayan language, a knowledge shared by but two or three of our countrymen. At another time he visited the rarely frequented portions of South America, and while off duty crossed on horseback the immense pampas of Buenos Ayres, climbing the Andes, and penetrating from ocean to ocean. At another time he was, like Humboldt, in love with the tropical luxuriance of Brazilian scenery, and with half a dozen followers penetrated far into the interior on a scientific mission. The journey offered many subjects of interest to a person who so keenly enjoyed viewing the magnificence of nature, and the habits of a wild and picturesque people. He was also engaged on the Boundary Commission for running the dividing line between the United States and Mexico. But Lieut. Strain is more generally known from his exploration of the Isthmus of Darien. Its ultimate importance as bearing on the practicability of an inter-oceanic canal, and the immediate interest excited by the display of so much personal heroism, has drawn to this little expedition a very large share of the public attention. With a party of twenty-seven men, in January, 1854, he left Columbia Bay on the Atlantic coast, and struck inland for the Pacific. Three attempts by English and New Granadian parties had already failed, and this, the fourth, was now carried to a successful issue, under circumstances which would have appalled the courage of almost any other man. After being given up as lost, this little party reached the Pacific, leaving by the way-side one third of their number, the victims of hunger and fatigue. The results of these explorations were embodied by Lieut. Strain in a valuable paper read before the Geographical Society. The last few months of his life were connected with another great work. In July last he sailed with Capt. Berryman, in the Arctic, to examine into the practicability of the Atlantic Telegraph. Returning, he passed the winter in New-York, confined to his room during a portion of the time by ill health, which rendered a visit to the South of immediate importance. Official duties detained him until May, and he died en route to join the sloop-of-war Cyane.

In judging such a man as Lieut. Strain, we must bear in mind not only

what he has done, but what he might have done. With hundreds of others, he suffered from a system fettered by routine and seniority, where responsibility cannot be attained until the first strength of manhood is passed, and where talent can by no management outrun mediocrity. Generally in a subordinate position, he never had under his command more than a dozen or two of men, and yet he has done much which the world will not willingly forget. In another position, he would have realized some of those great schemes which at all times agitated his restless mind.

Lieut. Strain was possessed of a peculiar facility in the acquisition of languages, and his travelling library was rich in works in French, Spanish, and Portuguese.

Had he been placed in a position to bring into play his unusual lingual acquirements, his energy, his immense powers of endurance, so severely tested on the Isthmus, he would have proved one of the most remarkable men the Naval service has ever produced. Comparing his life with what it might have been it was a failure; comparing it with the lasting good accomplished by most of his cotemporaries, it was eminently successful. Lieut. Strain was gifted as a conversationalist. In person, he was rather below than above the usual height, stoutly built, with blue eyes, and light brown hair and beard. He never married, and died in his 36th year.—*N. Y. Daily Tribune.*

IRON STEAMBOATS—THE "SANTA MARTA."

The adaptation of iron as a material of construction for steamboats of light draught to navigate fresh water rivers, has recently secured the building of several, designed to navigate the New Granadian coast and rivers, among which we take occasion to notice one in particular on account of the unusual amount of strength secured in her construction. It has heretofore been the general practise to assume that because the draught of water must needs be light, that the construction must also be light. In this vessel, however, the owners have not fallen into the same error. Wherever increased strength was required, there iron was used to furnish it. The boat referred to is the "Santa Marta," built by Boardman, Holbrook & Co., under the direct supervision of Capt. H. Robinson, who goes out in the vessel under canvass, her engines being already on the Magdalena river, and [illegible] of the late "Manzanares."

The "[illegible] 175 feet long, 32 feet wide, and 8 feet depth of hold [illegible] ched, 15 inches water—about two fifths of her load [illegible] signed for side-wheels, is a good model for

speed and, all things else considered, will doubtless be one of the fastest boats which have ever plied those waters. Her shell for the first 40 feet, as also her bilge and garboard, are of 3-8 iron. The frame is of angle iron, 3×3 inches; she also has angle iron around the gunwale. The clamps extend quite out to the shell, and the heads of the frames are secured to the lower edge by iron knees bolted to clamps and rivetted to the frames; she also has secured to her beams, which, with her deck frame, is of wood, plate-iron diagonal straps, screw bolted to the beams and rivetted to the frame. Her beams are 4×6 inches, of white pine chiefly, the most prominent beams being of yellow pine, 8×10; deck plank $2\frac{1}{2}$ inches of white pine. Her sheer strake, into which the beams are let, is of sufficient width and thickness to furnish an entire bearing of wood for the beams; this strake is secured to the angle iron outside, and to the beams and clamps inside. She goes out with her guards removed; the beams are designed to be lap-scarphed, of full size, when at her port of destination, and is fully prepared for a sea-voyage, the stanchions and rail being placed on gunwale, to be removed out to margin of guard. But, in addition to this, she has the elements of security, strength, and rigidity beneath the deck in greater measure than ever before has appeared in the United States, and which we have so long advocated in wooden vessels. Her keelsons, five in number, are of plate iron, the centre keelson extends from the shell of bottom to the deck, secured to the bottom and the deck beams, and made water-tight, is of $\frac{1}{4}$ iron, and is of this depth from the forward to the after bulkhead—from thence to the ends it is of diminished depth. The keelson at floor-heads and bilge are $\frac{1}{2} \times 13$ inches, with angle iron top and bottom, well braced to frames. She has four cross bulkheads, water-tight, of $\frac{1}{4}$ and 3-16 iron, secured to centre keelson by angle iron, well supported on both sides at quarter-breadth. She goes out with a keel of wood of 2 feet depth, secured by knees and screw bolts, and has two lee-boards of oak well strapped and properly hung on the side. The hold is divided into 8 water-tight compartments. This bespeaks an improvement in construction long needed. The model and designs were furnished by Mr. Griffith's, of this Magazine.

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[1] The Vanderbilt.—The new steamer Vanderbilt made a very quick passage to England from this port, considering it was her first trip. She left New-York on the 5th ult., and arrived at Cowes on the 15th, in the evening—the time being less than ten days. This is the fastest [illegible]yage made by any new steamer across the Atlantic.

WINDS AND WEATHER OF THE INDIAN OCEAN.

China Sea.—Two monsoons prevail in the China Sea, the South or S. W. monsoon, and the opposite, North or N. E., and they succeed each other at intervals of six months. The S.W. monsoon blows from May to October—the N.E. from November to May, and they both have considerable influence on those of the adjacent seas. Like those of the Indian Ocean, these monsoons do not set in at the same time in all parts of the China Sea.

On the western coasts the S. W. monsoon begins in April, and is not established out at sea till a month after. It does not prevail on the north coast of Borneo, at Palawan, and the Phillipines, till between the middle and end of May. In the southern part of the China Sea, it is found later than in the northern part of it.

In the Java and Molucca Seas, the S. W. monsoon is not established till a month after it prevails in the China Sea. It lasts six months, and terminates, as it does on the coasts of India, before it does out at sea.

The N.E monsoon, which succeeds it, extends in the same manner successively to the southward out at sea; so that to ascertain when the monsoon would commence in a particular part, it would only be necessary to know when the opposite monsoon was established, and then allow it a duration of six months.

In the month of May light variable winds are often found in the China Sea, and with the S. W. Monsoon, East or S.E. winds are occasionally found for a day or two. This occurs chiefly in the northern part of the China Sea, and also frequently during either monsoon.

In the S.W. monsoon, especially from June to August, there are heavy rains, sometimes attended by violent squally weather. At the same time in the Formosa Channel, the wind is frequently found varying between north and east. These three months are the strongest of the S.W. monsoon, and those in which it is most steady. In September the wind is unsettled, often varying between N.E., east and S.E. However, S. W. winds are still found to prevail, and last till the syzygy of the beginning of October. The monsoon then changes, and about this time a storm occurs, in which the wind comes from the S.W., changing to west and N.W., bringing rain; the wind afterwards changes successively to N.N.E. and E.N.E., and then the N.E. monsoon is established. The month of October is a bad one for the navigation of the China Sea. Sometimes it is rainy; generally, however, at the close of the month the weather sets in fine.

The N.E monsoon commences on the western coast of the China Sea, about the 15th of October. In the southern part of this sea it is seldom found before the month of November. In some years September and October are fine, and the N.E. monsoon does not invariably set in with a squall. It is at its height in December and January. This monsoon is sometimes attended with rain, and always produces much sea, especially near Pulo Sapata and between this island and Singapore. But it is not without its intervals of fine weather. The variable winds of October, November, and the beginning of December which blow on the coast of Palawan, admit of sailing N.E and S.W. during these months, but frequently with a cloudy sky and dull weather.

During the N.E. monsoon the wind is generally from north to N.E. on the coast of Luconia, and when it occasionally veers to N.W. or west it blows hard, with rain. This N. E. monsoon weakens in February. During this month and that of March it is but moderate, and the weather is then very fine in the China Sea.

Towards ... of the monsoons, when they lose strength, alternate land and sea breezes ... found ... sts. In March and April they are fresh and most regular. Towards end ... and beginning of October they are also established, but are no. so

strong as in the former months, nor are they established so regular. At the change of the monsoons the wind is unsettled and variable. These periods are distinguished by stormy weather, and those of the September equinox are severe as well as those of October. In these months, as well as in November, the wind is fresh with occasional calms but of short duration.

Coast of Malacca.—On the eastern coast of Malacca the weather is fine from April to October, while it is bad on the western coast of the same peninsula. On the eastern coast in the month of June a S.E. wind blows during the day; in the evening it changes to West, lasting till ten or eleven o'clock in the morning.

During the N.E. monsoon rain is constant on this coast, and the change from the S.W. monsoon to the N.E. is frequently attended by heavy storms. The return of the S.W. monsoon, at the conclusion of the N.E., takes place calmly and quietly.

Gulf of Siam.—In the Gulf of Siam the monsoons set in and finish sooner than in the other parts of the China Sea, and the wind there is generally not so regular. The S. W. monsoon begins in April, and is followed by continual rain during May and June. In July, August, and September the weather is still rainy, with a westerly wind.

On the coast of Siam, from March to May, southerly winds are often found, which from June to August become S. W., blowing very fresh, especially near Pulo Oby. From the month of September the wind becomes variable. In October the monsoon changes with a fresh breeze from S.W. In November, December, and January the weather is fine and the wind steady at north. In February the wind is variable between south and east, and during this month and the beginning of March the land and sea breezes are regular.

On the western coast of the Gulf of Siam, in May, June, and July, when the S.W. monsoon is at its height, a land breeze prevails for from three to twelve days.

Coast of Cambodia.—On the coast of Cambodia, in June, July, and August, there are heavy rains with S.W. winds. On this coast the monsoons are not regular, and land and sea breezes are met with when the prevailing monsoon is weak. During the S. W. monsoon these breezes do not last more than five or six hours, and they are not so fresh as those which prevail at the end of the N.E. monsoon.

Islands of Pulo Timoan and Pulo Condore.—In the islands of Pulo Timoan and Pulo Condore, the N.E. monsoon is established towards the 15th October with fine weather. The S.W. monsoon brings rain and lasts for eight months. In November, near these islands, we have calms, storms, and rain with tornadoes. At Pulo Condore the rains last for a month after the establishment of the N.E. Monsoon. At Pulo Timoan the wind becomes unsettled in September, and the change of monsoon brings bad weather. In November the weather is fine.

On the coast between the Gulf of Siam and Cape Palaran, the S.W. monsoon blows along the shore. Sometimes, near the land, during night, a light land breeze is found, which, falling calm, is succeeded by the wind of the monsoon, which blows fresh during the rest of the day.

On this coast the N.E. monsoon is established from the end of September or beginning of October till the middle of April.

Coast of Cochin China.—On the coast of Cochin China wintery weather is found with the cold northerly winds, accompanied by rain, that prevail from December to February. The season of the great rains includes the months of September, October, and November. During the N.E. monsoon, easterly winds frequently occur. Between the Paracels and the coast the same winds prevail as far as Cape Vareia; and in this channel calms frequently prevail while to seaward from this bank the monsoon is blowing fresh and regularly.

During the S.W. monsoon on this coast, the land and sea breezes are tolerably regular, and the sea breeze is replaced every evening by a land breeze, which, although it does not always commence at the same time, blows every night, and is followed by a calm or a light wind, generally lasting till noon, when the S.E. wind again sets in.

On the coast of Cochin China, the winds are variable during the whole year, and the monsoons mostly light. The leeward coast is not dangerous with the N.E. monsoon.

Gulf of Tonquin.—In the Gulf of Tonquin we find two seasons, the wet and dry. The former is the hotter time of year, and begins towards the end of April, lasting until August, when the rains moderate and September and October bring tolerable weather. In November commences the dry season and about the middle of this month strong northerly winds set in, varying to east and E.S.E. towards the close of it.

Towards the end of December the wind from N.N.E. becomes East, accompanied by fog. During January and February it is from N.E. and N.N.E. In April the wind is not so fresh, nor is the weather so cold. In the Gulf of Tonquin typhoons are met with.

Coast of China.—On the coast of China, from the island of Hainan to Amoy, S.W. and N. E. monsoons are subject to the same variations generally as those of the China Sea. But on the coast opposite to Formosa it is said that northerly winds prevail for eight or nine months. During the N.E monsoon on the south coast of China, the wind is E.N.E. along the land, sometimes drawing along the coast, and at others to the S.E. We rarely, however, find regular land and sea breezes: those we speak of are more solar breezes. On the south coast of China, during the S.W. monsoon, southerly and S.E. winds are frequently met with. In June, July and August there is a great deal of rain there and the weather is dark and cloudy.

On the east coast of China, north of Canton and as far as the Chushan Islands, as already observed, the two monsoons prevail.

The N.E. monsoon on the coast comprised between Macao and Chushan generally begins in October and lasts till the beginning of May. This monsoon is at its height from November to January; it is generally a double-reef breeze. There being always a nasty sea with these winds, which are steady between N.E. and north, ships cannot carry much sail to them, and should always keep as close to the shore as possible, as the sea there is smoother than outside.

In the N.E monsoon heavy winds, lasting for two or three days, will set in, which are considered to belong to a typhoon at sea. When this violent wind ceases, for several days a light breeze sets in from the East. But after a week or ten days it again freshens, blowing hard and producing a heavy sea, especially at the entrance of the Formosa Channel.

In October, November, and December, the weather is tolerably fine, and not a day passes without a break in the rainy and cloudy weather. From January to March a great deal of cloud and fog hangs about. In April the N.E. monsoon loses strength for a day or two sometimes the wind changes to south, when the weather then becomes thick, and heavy squalls follow from N.E. till the middle of May.

The S.W. monsoon, varying to S.S.W. and south, begins in June or July, and ending in October, is attended with storms and typhoons.

In the zone of these monsoons the rainy season, on all the coasts facing the west, is during the S.W. monsoon; and on the contrary this is the dry season on all those coasts facing the east. When the N.E. monsoon prevails in its turn, the coasts facing east are subject to rain, while those facing west have dry weather.

Formosa Channel.—In the Formosa Channel, between that island and China, bad weather may be looked for at all times of the year. Even in the summer, and also towards the middle

of the S. W. monsoon stormy and squally weather prevails, accompanied by torrents of rain.

In the channel comprised between Formosa and the Phillippines, bad weather is found at all seasons. In the N.E. monsoon, the wind is principally from E.N.E., as far as the opening of the channel, where it becomes N. b. E. and N.N.E. About the Bashees it is N.E. and E.N.E., causing a heavy sea. On the Eastern coast of Formosa variable easterly winds are found, favorable for ships going northward of the island, but which become there N.N.E. As a general rule it may be considered that where the wind hauls gradually to the Southward of east, it soon returns northward again with double its strength. Heavy N.W. winds sometimes last for several days following on the north coast of China, and reach to a good distance out to sea. The barometer is of little use in giving warning of these winds, common as they are, for it is very high with a strong northerly wind which sometimes prevails. When the wind has gone round the compass, it generally returns suddenly to North, blowing so hard as to compel ships to shorten sail.

Phillippines.—Among the Phillippine Islands prevail the two regular monsoons which are met with in the China Sea. They even sometimes extend as far South as the Marianne Islands in the Pacific Ocean, and as far north as the coast of Japan.

The Philippines being a group lying north and south, their high land naturally interrupts the regular course of the wind: and hence it is, that at forty or fifty leagues from them, ships encounter so much bad weather sometimes, and which becomes worse as the islands are approached.

The N.E. monsoon begins about October, with fine weather lasting till April, and varying to the northward; but if it should veer occasionally to N.W. it blows hard.

The S.W. monsoon is not known here till between the beginning and end of May: nor does it become regular till June. During this monsoon the weather is gloomy, cloudy, without a tint of rain. Sometimes about this period severe storms occur, called *Collas Tempestades or Vaguios.* They are generally accompanied by thunder and rain, the wind changing about and blowing with the same force from all points of the compass. These collas and bad weather take place at the end of July or middle of August, and sometimes in October. They are not unlike the typhoons which will be noticed presently.

In September the wind loses strength, the rain is less, and the sky becomes fine: but this in some degree is compensated by morning fogs, which last till noon.

At the change of monsoons bad weather is sometimes experienced as in the China Sea.

Island of Luconia.—In February and March, about the end of the N.E. monsoon, on the coast of Luconia, the wind is variable, and often with a tendency to follow the course of the alternate land and sea or solar breezes. In the month of April the alternate winds are well established; and from June to October, the period of the S.W. monsoon, the wind which blows upon the coast at right angles to it brings rain.

Island of Palawan.—The island of Palawan does not present anything in particular, and the monsoons near it are the same as those of the China Sea. Near the west part of this island, however, in September and part of October, there are strong S.W. winds, accompanied by dark and rainy weather. On the north coast in these months and in December, the wind is variable, but fair for vessels from N.E. or S.W.; but the weather is generally cloudy at this season.

Island of Borneo.—The island of Borneo forms the N.W. and western boundary of the China Sea. This island is intersected by the equator; and, as we find in Sumatra, the consequence is that the monsoons of the N.W. coast do not happen at the same time as those on the west coast. Thus the S.W. monsoon prevails on the N.W. coast from May to October, while at the same period the S.E. monsoon prevails on the west coast; and

the N.E. monsoon blows on the N.W. coast, while the N.W. monsoon prevails on the west coast.

The S.W. monsoon is not established on the northern part of Borneo till between the 15th and 30th of May: the rain then continual. In September the weather is not so bad, and the dry season sets in with the N.E. winds varying to east. However, this can hardly be considered the dry season, for, owing to its position under the equator, the island is inundated with rain.

On the western coast the S.E. monsoon prevails towards the end of May, bringing fine weather. From September to April the west or N.W. monsoon prevails, with heavy rain, and sometimes strong gales.

Typhoons.—The typhoons of the Phillipines and the China Sea sometimes extend as far westward as Calcutta. They are not always preceded by any signs which might place the mariner on his guard against them; in some instances they are preceded by fine weather, with a clear sky and fresh or moderate breezes, generally blowing in an opposite direction to the prevailing monsoon, which is S.W., for the typhoons only happen between June and November. The prelude to one of them is frequently a thick heavy dark cloud near the horizon in the N.E. The upper edges of it are copper-colored, and the higher they are the more vivid is the color. When this cloud rises and moves rapidly, the typhoon bursts, producing rain, thunder, and lightning; sometimes an hour of calm succeeds the storm, which generally lasts twelve hours; then the S.W. wind blows almost as hard, and establishes the equilibrium. The barometer is the best indicator of these tempests. Near the coast of China they generally begin from N.W. to north; the wind afterwards veers to N.E. and east, from which quarter they blow strongly, causing a heavy sea and strong currents setting westward. The wind then changes from east to S.E., then to south, after which they become more moderate. The shifting of the wind in this direction during the typhoon, is only found in those which sweep along the coast of China, for at the distance of forty or sixty leagues from the land, these changes of the wind are experienced in a contrary direction;* that is, the wind beginning at north or N.W., instead of veering successively to N.E. and east, changes to N.W. and west, whence it blows violently, afterwards decreasing in proportion as they reach S.W. and south.

Typhoons rarely take place more than once in an interval of three or four years. The zone in which they blow extends from 30° to 10° north latitude, although they rarely pass 16° north latitude. With regard to longitude, they occupy the space comprised between the coast of China and the meridian of 150° east.—*Lon. Naut. Mag.*

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* This results from being on the opposite side of the line or course on which the whole meteor is advancing.—Ed.

A Relic of the Past.—The bark *William* and *Anne* arrived at Savannah from Barcelona recently, where her long and successful career brought her into immediate notice. She was built in 1757, and in 1759 carried General Wolfe to Quebec. She was originally built after the old English man-of-war fashion, but has been modernised by having her stern rounded off. She is commanded by Capain McGull, and looks staunch and strong, as though she could weather many more voyages.

EARLY HISTORY OF SHIPBUILDING IN NEW-YORK.

In the development of industrial resources, there is no department which furnishes so clear an exponent of national greatness as that of commerce; and while the genius of American institutions shall continue to be the signal light of liberty, her ships will prove loyal to the laws of flotation, as they unfurl the banners of freedom and furrow new channels in the edicts of barbarism, ignoring the boundaries of that tideless sea of ignorance and superstition, rendered stagnant by the enervating arm of usurping power, or by the hush of marshalled armies and glittering steel. If there were no other page of American history to point posterity to the fame and fortunes of their ancestors, the names of her ships, with the deeds of her mariners, would furnish a preface of which the nation might well be proud. England may boast of her wooden walls, with their frowning batteries, but the merchant marine of the western world is very properly regarded not only as the proudest emblem of national greatness, but as the best adapted models on the globe. A volume of no inconsiderable size would be required to do justice to the history of American vessels, but within the compass of an article we can only give a brief sketch, with the names of those which have been constructed during the present century in this emporium of commerce.

Thomas Cheesman was, by the best authenticated chronicles, regarded as the first ship-builder in New-York; he was admitted as a citizen of New-York in 1756. One of his sons, named Jacob, fell while storming Quebec with Gen. Montgomery. Another son, named Forman, the father of Dr. John C. Cheesman of New-York, was born in 1763, and acquired a knowledge of the mysteries of shipbuilding from his father; his ship yard was on the East river, near the foot of what is now called Rutger street. His career was a successful one, so much so that the government employed him to build the frigate President, a vessel not differing materially from 2,000 tons. This ship was launched in the year 1800 from Corlear's Hook, and was the first vessel for which (what is now called) the patent rudder was made. The history of the frigate President has been stereotyped, not only in the temple of fame, but upon the historic page, with the name of her builder, and has audibly admonished the government, from that time to the present, that if they would have the fastest war vessels afloat, they must adopt the measures of Commodores Chauncey and Decatur, and employ competent builders to model and construct them. Contracts for the construction of all the government vessels was tendered to Mr. Cheesman by these distinguished naval officers, which he declined accepting, in consequence of his subsequent partial adherence to the tenets of the Society of Friends. He built the Braganza of 300 tons, and was

joined later in his building career of merchant vessels, by Charles Brown, and they continued to build vessels, both at the upper and lower yard. Previous to the construction of the frigate President, Philadelphia had borne off the palm of successful rivalry in shipbuilding, but now it began to be believed that it was quite as much, if not even of more consequence to secure the proper men to build than the proper place, inasmuch as the right men would find the right place.

Mr. Cheesman built the Ontario, a ship of 500 tons, in 1796, and Samuel Acerly, a cotemporary builder, launched the ship Draper, of 300 tons, in 1798; the Draper was designed for the Dublin traders, and had heavy bilge strakes and bilge keel to support her bottom when grounding on Dublin bar.

But these were not the only shipbuilders of New-York: Thomas Vail and William Vincent built vessels prior to 1800. The result was that the ships Eugene, Severn, Manhattan, Samson, Echo, Resource, York and Oliver Ellsworth, were vessels worthy of the age, the place, and the men by whom they were built, as a proof of which it may not be out of place to say that the Oliver Ellsworth, in 1804, when commanded by Captain Bennett, made the eastern passage from New-York to Liverpool in 14 days, notwithstanding she carried away her main topmast during the passage. All the shipyards from which these vessels were launched, were below Grand street. Mr. Ackerly's yard was bounded by Pelham street on the west, and by Lombardy and Cherry streets on the north and south. The Manhattan, of 600 tons, was built here, and was regarded as a monster of the deep; she was designed for the East India trade, and was watched with a jealous eye, because of the heavy draft she made upon the number of seamen belonging to the port. It was from this yard the Black River was launched, several brigs, and a frigate for the government—all previous to the present century.

Henry Eckford, a man of indomitable energy and extraordinary ability, came to this country in 1796, and in 1801 established himself in business alongside of the Navy Yard, and soon after joined Capt. Bibee, when they opened a ship yard at the foot of Clinton street. From this yard he launched the ship Beaver, in 1803, of 427 tons register, and carrying 1100 tons of cargo. This vessel was owned by Mr. Astor and was destined for the China trade, had a live oak frame. Capt. Augustus De Peyster, now Governor of the Sailor's Snug Harbor, at Staten Island, made his first voyage before the mast in this vessel; she made, on one occasion, her homeward run from Canton to Bermuda in 75 days. Capt. De Peyster subsequently commanded this vessel in which he had sailed when a boy. In 1802 Thomas Vail contemplated retiring from business, and as a prelude gave a sub-contract to Adam & Noah Brown, brothers, who completed the

same, took the yard, and became not only successful but prominent builders.

Christian Bergh, about the commencement of the present century, assumed the responsibilities of a shipbuilder, and in 1804 built the North America, a ship of about 400 tons; she was a dull sailer, and was employed chiefly between Russia and Great Britain. Mr. Bergh built also about that time a large brig, the Gipsey, of near 300 tons, a very sharp vessel, if dead rise will make a vessel sharp, carrying a very considerable less than her tonnage—a mistaken mode of securing sharpness, which some shipbuilders have not materially improved at the present day. It was said that she was unfortunate, having no lifting power to counteract the leverage of her spars; but the true secret of her misfortunes lie in her want of stability, consequent upon her great amount of dead rise. In 1810 she was dismasted, while on a voyage from New-York to Batavia with a cargo of notions, then under the command of Capt. Maine, when about 700 miles from the Cape of Good Hope; while scudding in a heavy gale, with high sea she ran under and was thrown on her beam ends. The lower masts and bowsprit broke by the board, when she righted with her cabin and forecastle full of water, and half of her crew drowned. Her voyage being broken she put into Mauritius and from thence home, was then rigged into a schooner, went to France, was chased by the English blockading squadron, and in a heavy squall was lost, and all hands perished. The ship Trident, built by Adam & Noah Brown in 1805, was said to be a fine vessel, designed for the East India trade; her burthen is set down at between 500 and 600 tons; she was a fine sailer and was commanded by Capt. Blakeman. The Triton was built by Charles Brown in 1804, was 400 tons, went to Liverpool, was coppered, and sailed thence to India. The same year Adam and Noah Brown built the ship Francis for the Greenock trade, but in consequence of her tree-nails being too small for the size of the holes, they were drifted out in Greenock, where and when she was retreenailed;—a few such lessons would be of service at the present time, in more places than New-York.

Among the first ships built by Mr. Eckford was the Samuel Elam, of 350 tons, at first named the Sportsman; she was commanded by Capt. James Noble. This vessel had a full figure of a man on horseback, which gave her bowsprit a very great amount of steve in order to clear the figure or man's head. It was then the custom to furnish the bow with large figure-heads, and the sterns with large quarter-galleries; the Samuel Elam was a vessel of this description; her galleries, it is said, were somewhat burdensome, which, in connection with her buttocks, caused the vessel to steer badly· but whether it was owing to the extension of her

buttocks beyond a just proportion, or to the distribution of sail we have no means of determining.

It was in those days usual for shipbuilders to exact one year to build a ship of say 350 tons. The Philadelphia shipbuilders, previous to the present century, were bold enough to run three mouldings on the top sides of all Philadelphia built ships, while the modest pretensions of the New-York builders forbid their putting on more than two mouldings. But truth is stranger than fiction, and time has divulged the secret of the marvellous change. Adam and Noah Brown, who had built the China, a Canton trader, and subsequently raised upon her greatly to her detriment in stability, cut her down in 1803, and converted her into a privateer, when her name was changed to that of Yorktown, and she was placed under the command of Capt. Riker. George James, early in the present century, became a cotemporary shipbuilder, and added to the list of New York ships such as done credit to his name. The embargo which was laid on all vessels within the ports of the United States, was passed by Congress in 1807 and, to a great extent changed the complexion of shipbuilding; but few vessels were built, some of which wore a beligerent aspect during the time of the non-intercourse act and subsequent war. The schooner Governor Tompkins was built and sent out as a privateer, also the Paul Jones, Teazer, Saratoga, General Armstrong and others—all celebrated vessels of their class, some of them carried from 16 to 18 guns. The commander of the General Armstrong performed many daring feats during the war of 1812. One of his Majesty's frigates once found him an unwelcome visitor under her bows in the English Channel, and the commander of the frigate had some very serious misgivings lest he should execute his unmistakable purpose of opening a raking fire; but the sable mantle of night prevented the General A. from giving it, and the frigate from receiving it, and each took care of himself. This daring commander immediately afterward declared an English fort under blockade, being not less proud of his vessel than of the bunting she wore, he shunned no danger and feared no foe.

In 1804 an old Dutch Corvette named Swift came into port in distress, and was condemned, purchased by Adam & Noah Brown, rebuilt and sold to Captain Jacob Smith, of Newport, Rhode Island. She had been built in Amsterdam fifty years previously, and had been a cruiser for forty years, after being rebuilt she went from Montevideo to Newport in 32 days, and was two days in a fog off Montauk. Sydney Wright having apprenticed himself to Henry Eckford, served out his apprenticeship, and then became a most successful builder under the patronage of his uncle, Isaac Hicks. Mr. Zeno Carpenter and Mr. White opened a ship yard and secured a reasonable share of the work of building in the early years of the

present century. Mr. John Floyd also commenced building vessels about the year 1805, and in 1807 built the ship Carmelite of 400 tons, and was soon after appointed Naval Constructor by the government at the Brooklyn Navy Yard.

The work of shipbuilding, as already remarked, became stagnant during the embargo, and some of the most prominent builders having had inducements held out to them by the government, migrated with their workmen to the Lakes. It became the fixed policy of the government to secure and maintain the supremacy on those inland seas. Mr. Eckford was employed by the Department in the construction of war vessels at Sackett's Harbor on Lake Ontario; Adam Brown was at Stores' Harbor, while Noah Brown was at Presque Isle, Lake Erie, preparing a fleet for Commodore Perry. All these operations were under the direction of Mr. Eckford. Purchases at these several points had been made by Commodore Chauncey for the government, but as no appropriations had been made by Congress for the payment for those sites for building, Mr. Eckford took them, with the understanding that he would be reimbursed by Congress. In this and in other ways he expended during the war some hundreds of thousand of dollars, and incurred responsibilities to the full extent of his credit in behalf of the government. Stephen Smith and Isaac Webb were apprentices at this time, and afforded him material aid; the former was his draughtsman, there being no models used in those days. Mr. Eckford had already become the master mind of the age in the line of his profession; his high-minded and dignified proclivities, his unbending integrity of purpose, added to his great mechanical talents won for him the admiration of all with whom he had to do. A first contract being completed, a second was entered into, which was not finished when the proclamation of peace concluded his labors on the Lakes. A short time previous to the relinquishment of this field of labor, they were visited by a celebrated English Shipbuilder, who unhesitatingly expressed his astonishment at the expedition displayed by the American builders. All the vessels of the second contract were then on the stocks, though none were finished. As a consequence, commissioners were appointed by the government and sent on to appraise them. So much confidence had they in the integrity of the builder, that they were guided solely by his judgment in the formation of their decisions. This ended the operations of Mr. Eckford and his assistants on the Lakes.

(*To be continued.*)

ESSAYS ON THE LAW OF SHIPPING.

BY WILLIAM W. BADGER, ATTORNEY AT LAW.

No. 1.—The Shipowner's Lien on the Cargo for Freight.

I. *Its Nature and Origin.*
II. *Its Extent.*
III. *How it is affected by Contracts.*

I.—*The Nature and Origin of this Lien.*

The existence of the ship-owner's right to retain the cargo as a security for the expenses and rewards of carrying it, in the absence of any special agreement inconsistent with such right, seems to have been recognised in the earliest records of the law, end doubtless dates its origin with that of navigation itself. It is acknowledged by all the writers of the maritime law in the European nations, and has been adopted from them into the English and American common law, and sustained by judicial decisions through hundreds of years.

"L'ordonnance de la Marine," compiled by the authority and under the direction of Louis 14th, in 1681, and embodying the customs of most of the commercial nations then existing says: "The ship, her apparel and furniture, the freight, and the merchandise laden are respectively bound to the conditions of charter party."

Volin, in commenting on the above nearly a hundred years later, remarks: "The goods of the shipper are specially bound to the payment of the freight. The Master not only has the right to retain them in his ship until the payment of the freight, but he can also prevent their removal after they are unladen, or he can take possession of them in the lighters, or the storehouse, and even from the consignee, at any time within fifteen days if they have not passed into third hands."

These regulations have been somewhat modified by subsequent ordinances, until we find it laid down in the modern French code, and prevailing in most foreign ports, that—"The Master cannot retain the goods *in his ship*, in default of the payment of freight, but he can deposit them in a warehouse, until his claim for freight is satisfied," and "shall be preferred for his freight over all other creditors of the goods, even for fifteen days after delivery to the consignee, if they have not passed to third parties."

The early English writers lay down the same doctrine and consider it an established principle of the maritime law. Molloy, as early as 1682,

remarks: "The lading of the ship in construction of law is tacitly obliged for the freight, the same being in point of payment preferred before any other debt to which the goods so laden are liable, though such debts as to time were precedent to the freight; for the goods remain, as it were bailed for the same."

Beawes, more than a century later, adopted the same words as the law of his age in his Lex Mercatoria.

From these authorities it would seem that the true character of this lien could be easily understood, but a curious discussion has arisen among later writers as to the exact principle which should govern it and determine its application. It was early confounded with the lien of inland common carriers, and has been very generally considered to be identical with that lien.

It was decided in the reign of Charles II. that ships sailing the ocean were common carriers, and that doctrine has since been constantly affirmed. Lord Mansfield particularly declares it, and Chancellor Kent remarks, "There is no distinction between a land and a water carrier." Chancellor Walworth also particularly distinguishes this lien, and declares it to be in the nature of the common law lien."

Notwithstanding these authorities, an attempt has been made in most influential quarters to establish a distinction between these liens that shall lessen somewhat the security of the shipowner.

The most recent and by far the ablest work on Maritime law ever published in this country—Maritime Contracts, by Hon. Theophilus Parsons—suggests that a ship is not properly called a common carrier unless she be a regular packet, or a general ship, carrying goods for all persons who offer them; and that this excludes many vessels which by charter-party, or other special agreement, contract to go a particular voyage, which they never went before, and perhaps never expect to go again. It also suggests that the shipowners lien is more analagous to another kind of common law lien, that which every bailee who by his labor and skill has conferred value on a specific chattel placed in his care for that purpose, has on it for his stipulated reward.

This ingenious distinction has been recognised by the Courts in several cases, the strongest of which is the decision of the Supreme Court of the United States in the case of Gracie *vs.* Palmer, which holds, that the goods are increased in value by the cost and cares of transportation, and are in the custody of the shipowner as the bailee of the shipper, whose possession cannot be violated until the laborer has received his hire.

Notwithstanding this recognition of the principle of bailment as applied to this lien, it is by no means the *present* law. The whole current of authority holds directly that there is no difference in principle, whether

the merchant takes the whole vessel by charter-party or sends his goods in a general ship: in either case the lien for freight is privileged in the same degree and to the same extent. Neither does it make any difference whether the goods have been increased in value by the transportation, or decreased in value by being sent to a bad market, or by deterioration on the voyage; nor whether the vessel be a regular packet or not; as in each case the lien for freight will always exist, in the absence of any special contract disallowing it.

The shipowner's lien is therefore strictly a maritime lien, having its origin in the earliest history of the maritime law, and is entirely distinct from all other liens, though in most respects entirely analogous to that of the common carrier. It differs from other maritime liens in being made to depend upon possession, either actual or constructive, and if the shipowner therefore part with the cargo without stipulations that he retains his lien upon it, he will lose it.

II.—*The extent of the Ship-owner's Lien.*

The goods of the shipper may not only be detained for freight, properly so called, but also for the rent or hire of a ship under a charter-party, if the ship-owner retain possession of the vessel, either actual or constructive, during the voyage; though, in such cases, the goods of other persons than the charterer, even if the charterer be bankrupt, can only be held for the sums they have severally agreed to pay by the bills of lading. In England the shipowner cannot detain the cargo by way of general security for the performance of the covenants of the charter-party, although it all belongs to the charterer himself. The lien is there confined to the specific chattel, or some part thereof, in respect of which the freight is claimed; and therefore goods actually carried cannot be detained for the breach of a covenant to furnish a full cargo, nor for demurrage, or pilotage, or port-charges, although the shipper may even have agreed to pay them. The clause usually inserted in charter-parties, by which the shipper binds the goods to the performance of his covenants, is considered by the English Courts to be a mere nullity, not only in law but even in equity. Although they admit that this lien may be varied and enlarged in its extent by special contract, they hold that the clause above mentioned, however explicit it may be, does not constitute such a contract. This has long been considered a great absurdity in the English law, has never been adopted in this country, and there seems to be some quiet humor in the language of Judge Story in regard to it, in the case of the Volunteer—1 Summers' Re. 575:

"The course of reasoning by which it is sustained," said Judge Story,

"amounts to this: that, because by the law of England an active remedy by a proceeding *in rem* is not provided for in all cases under this clause, therefore no passive remedy by way of lien at law can exist for either party; and that *though the language* of the parties binding the property *is clear, they cannot intend it*, because there cannot be a mutual remedy, and *it would be inconvenient for them to have their property bound* for the performance of covenants generally, sounding in damages."

We need hardly add that the opposite doctrine prevails in America, and that the clause mentioned above does constitute a contract, and will bind the cargo by lien to the performance of all the covenants of the charter-party. So any part of the cargo may be held for the freight of all which was shipped under the same bill of lading, and also for the usual fees of primage and average, and all other charges included in the contract of shipment.

The Master's charges for primage and average, though originally a voluntary contribution of the shippers, designed as a reward for the Master's extra care and prudence, is now recognised as a legal lien on the cargo, and may be sued for in the admiralty courts, unless it has been commuted, as it usually is, at a certain percentage on the freight.

III.—*How this Lien is affected by Contracts.*

Two classes of contracts will be found to include all that are usually made affecting this lien. They are both known by the general name of charter-party, a word, in itself, meaningless and absurd, but whose uncouthness is somewhat redeemed by the fact that it represents the Latin words *charta partita*, a divided chart, and arose from the custom of drawing contracts of affreightment in writing, and then cutting them in two, giving the shipper one half, and sending the other half with the vessel; the object being to put the parts together again on the return of the ship, and thus confirm the contract, while, if the ship was lost, half of the contract was lost with it, and no freight could therefore be collected, as none had been earned. By the charter-party the entire ship, or some entire part of the ship, is let to freight, either for a gross sum for some particular voyage, or for a particular sum by the month or week of the ship's employment; and a somewhat perplexing question arises, as to who is entitled to the rights and subject to the liabilities of ownership during the existence of such a contract. This question was for a long time unsettled, and caused the greatest conflict of opinions in the earlier cases, but it is now fully established, that if the owner of a ship give up to a charterer the entire control and navigation of the ship, whether it be manned and equipped or not, he gives up also his right of lien on the cargo for freight, and the charterer

is considered for all purposes the owner during the existence of such a contract. In such cases the real owner trusts entirely for his pay to the personal responsibility of the charterer, the hire of the ship being considered more in the nature of rent than of freight, and great care should therefore be taken to let only to substantial parties, or to obtain sufficient security for the rent before the voyage is begun.

As the charterer in such cases is entitled to all the rights of ownership, so he is subject to all the liabilities, if the shipper suffer a loss from his fault; and the real owner should therefore not only take security for the actual rent of the ship, but for any damage which may happen to the cargo, which would give the shippers a lien on the ship.

The second, and much the larger class of contracts, includes those in which the owner does not give up the entire control and possession of the ship, but retains the command in himself or his master. In such cases, although he may let the whole carrying capacity of the vessel, the exclusive use and disposal of the "entire reach and burden of the ship," yet he retains the character and the privileges of owner, and the charter-party is considered only a large bill of lading, or mere contract of affreightment, sounding in covenant, and the charterer is not clothed with the character or legal responsibility of ownership.

These principles are well-settled and generally understood, but much difficulty has been experienced in determining to which of the above classes certain contracts belonged. For instance, it is quite common for the owner to let a furnished ship, with his own master and crew on board, pay all the expenses of the voyage, and yet allow the charterer to appoint a super-cargo, with power to control, more or less, its direction and extent. The ownership, in such cases, must evidently accompany the balance of power between the Master and the super-cargo, and whichever of these is the real *Master*, and has the greater control of the voyage, is the representative of the owner for the voyage. It is evident from the current of the authorities that the shipowner's lien for freight is one favored and protected by the law. It is considered essential to the well-being of trade that its silent influence should prevail, to promote integrity, and establish that mutual confidence among men which is the soul of commerce, and which binds nations, as social intercourse does individuals, in the strongest natural bonds to live in peace.

The owner may of course waive his right of lien, but it will require specific words to that effect, or some positive stipulation in the charter-party inconsistent with it, for without such words or stipulations, even terms of actual demise of the whole ship have been held not to afford a decisive criterion of the intention of the parties to waive the lien. So he may waive it by a delivery of the goods before freight is paid, and if he

cannot afterwards recover the freight from the consignee, he may resort to the consignor, and maintain his action on the covenants of the charter-party; but a delivery effected by the fraudulent representations or deceptions of the consignee, will not deprive the owner of his lien.

Particular clauses in charter-parties will have no effect where they are evidently opposed to the general tenor and scope of the instrument, and the rule of construction will be such as to favor the existence of the lien, unless it appear, from consideration of the whole instrument, that it is excluded by express and absolute terms, or by a necessary implication from the contract.

These rules of construction are now well settled, and with the exceptions which we have noticed in the nature and extent of the lien, the law is substantially the same in this country and in Europe; and if conflict exist at all, it arises more from the variety of the terms and stipulations employed by the parties themselves in framing their contracts, than from any differences of opinion among the judges who interpret them.

A somewhat more limited rule of construction has recently been adopted in the Supreme Court of the United States, making it necessary to use caution as to the time and place where freight shall be made payable. The Court held: "If the owner of a ship stipulates to receive his freight at a time and place having no reference to the place for the delivery of the cargo, or at variance with such time and place, he is to be considered as having waived his lien."

This language seems to imply that the mere fact of the existence of such a stipulation, without any regard to its consistency or inconsistency with the lien, is to be the test; and if this be its meaning, we are obliged to acknowledge that we cannot see the wisdom or the policy of such a rule. Many such stipulations could clearly be made, which would be not in the least inconsistent with the right of lien, such as stipulations for freight in advance, or three days after sailing, or indeed at any time before the time for the delivery of the cargo, or in installments at different times or at different parts of the voyage. Stipulations are often made for payment by bills, and in such cases the rule is that the right of lien remains till they are given, *and revives after they are dishonored*, if the shipowner has not parted with the goods. Now, if the right of lien revives by the dishonor of a bill of exchange, why should it not also by the failure of any other method of payment. Suppose any of the above stipulations to have been made, and that by the unexpected death or bankruptcy of the shipper, or by any other unforeseen event, they fail to be fulfilled, is there any good reason why the shipowner should not resort to his lien as a security for his freight? We think not, and believe the above rule will be modified to meet such cases. It seems based upon the supposition that it

is the duty of parties in such cases to reserve the lien by express terms; and we cannot better answer that supposition and conclude this essay than by adopting the words of Judge Campbell in his able dissenting opinion to the above rule:

"The commercial law does not exact a stipulation to support the lien of the shipowner, but requires circumstances expressive of a 'determinate abandonment,' as the condition of its removal."—Raymond, *vs.* Tyson, 17 Howard, U. S. Re., 63.

10 Wall Street, New-York, June 13th, 1857.

COMPASS AXIOMS.

The following axioms are attached to *Saxby's Spherograph*, for correcting the compasses of steamers and iron vessels:

1. It ought to be understood that no precautions taken before leaving port can prevent changes in the magnetic condition of a ship.

2. No positive reliance can therefore be placed upon any previous adjustment or "correcting card,"—

3. It is, however, highly important that steamers and iron ships be carefully swung when in port, as often as convenient, and their magnetic condition ascertained, and a correcting card be furnished by a competent adjuster, as a general guide to a Commander.

4. Every iron ship should be possessed of a means of adjustment, or re-adjustment, by magnets on Professor Airy's or any other sound principle; it is easily performed by a Commander from the printed or verbal instructions generally given by the compass corrector when he places correcting magnets on board ship.

5. The Captain should always in person superintend the adjusting of his magnets, or the swinging of his ship.

6. Nothing but an observation from a known heavenly body, as a means of correction, is to be depended on, and re-adjustment by it ought not to be neglected in case of long-continued thick weather.

7. It is desirable to encourage and facilitate observation of such heavenly bodies by every possible means, and Saxby's patent spherograph is very simple, easy to be understood, and rapid in its use; moreover, it explains *principles*, and can never mislead.

8. A good compass is as important an instrument on board ship as a good chronometer, and no sacrifice to appearance or position of it is too great to be yielded in order to give it fair play.

9. Bearings can be more accurately taken with a "dumb card" than with a compass; for a dumb card being a fixture, and having no magnet, has no oscillations, nor can it be effected by local attraction; moreover, a dumb card may be used at any part of the ship, or aloft.

10.—No supposed accuracy of any means of compass correction can justify neglect of the lead, when in soundings, in hazy weather, or at night-time.

FOR THE U. S. NAUTICAL MAGAZINE.

THE SHIP-YARD.

The contract made—a ship goes on the stocks,
A flexile keel is laid along the blocks;
Support it well—it ne'er shall be again
So fairly blocked upon the raging main.

The stem is reared, unlike the prows of yore,
Adorned with eyes to see the way before;
Its two-fold form bespeaks the builder's name,
Whose skill designed and added to his fame.

The stern is framed and post on keel an end,
The fashioned timbers show how planks must bend;
Next, floors athwart and dead-woods fore and aft,
Bestrew the weakness in this noble craft.

The frames are raised—the buts in bilge abound,
To show her weakness when she gets aground;
The plummet's hung, the ribbands round her meet,
With maul and wedge they regulate complete.

The sheer strake hung—the eye will make it fair,
The edge is blacked and run down to a hair,
On clamps, the beams athwart and knees to fay,
When bolts are driven and clinched on rings they say.

The rabbet cut—the garboard strake goes on,
And then the flat, and next the bilge is run;
The boot-top now below the wales is clear,
When last in turn the shutter doth appear.

The squarer, caulker, scraper, comes in turn,
Their wake to take the painter does not spurn;
On cabin next the joiner plys his steel,
And painters following, on labor fix the seal.

The ways are laid, inclining to the deep,
Where now this fabric longs to make a leap;
The time now fixed, she leaves the solid earth,
While glistening waves seem proud to give her birth.

THE RESISTANCE AND PROPULSION OF SHIPS,

WITH REFERENCE TO COMMERCIAL UTILITY.

(*Continued from page* 187.)

IN a former article we considered the elements of Absolute Resistance to a ship's progress through the navigable fluid; it will be next in order to examine the principles of propulsion by which it is overcome. But two kinds of propelling power are generally applied to vessels, viz: wind and steam. These differ materially in the nature of their availibility for navigation. The wind is a natural agent, but quite independent of the will of mariners, being inconstant, changing, unequal and adverse, according to seasons, times and places. It is, however, the cheapest, and under some circumstances, the most efficient propelling power known. Steam is an agency that may be always under command; but it is expensive, and were not steam vessels invariably built sharper than those propelled by the wind, we doubt whether they would maintain any tolerable degree of popularity. But to the advantage of uniformity in application, steam power unites a model of less resistance, and the combination is regarded as superior for commercial purposes.

The economical use of steam for propelling vessels, is as yet very dimly perceived by the commercial public. The fact that it is more costly than wind, indicates that it should be employed at sea only for the purposes of the most remunerating services, among which we may instance the carriage of the mails, travellers, specie, express freight, and perishable commodities. The operations of Governments in peace or in war, can also be best facilitated through its instrumentality. The late era of clipper ship-building did much to unfold the powers of wind-propelled vessels for the higher uses of active commerce; but the general depression in business which has prevailed for the last two or three years, has prevented a complete development of their utility. The retrograde movement in modeling which has succeeded, will end with the re-instatement of commercial activity and prosperity, when we shall see greater strides in perfecting the capabilities of sailing-vessels than ever before witnessed. We do not mean to say that greater tonnage or sharper ships will be built, but that vessels of more perfect form, greater strength, and more efficient rig, and adapted better to special trades will leap forth upon the ocean, and perhaps jostle the steam lines that are now being projected in so many directions. It is when freights rule at *minimum* rates that the imperfections of shipping become most sensibly manifest to the owner; but, instead of making efforts to perfect the ship in model, construction, equipment, navigation and management, too often the unprofitable vessel is condemned because she

cannot carry a sufficiently large cargo. For the one idea of burthen new ships are therefore designed, and the remedy being one-sided, a kindred cure results.

Whatever advantages steam may have over wind power in respect to uniformity of application and facility for command, it is certain that these are compensated by increased cost and danger. It is art in rivalry with nature. One of the fundamental requirements from a propelling agent, is motion, which is to be communicated to the ship. The air becomes wind by being set in motion from various causes; its force is due to density and velocity. In every course except before the wind, the sailing-ship may have all the power she can appropriate—for she cannot escape its influence. There is no waste of propulsory force, due to its *following* the ship. But with a steam vessel the expenditure due to escaping from the propelling influence, is always present; it is always a "fair wind" for the steamer, so far as steam is involved, which is an advantage costing about half the expense for coals and machinery, and ultimately limiting the rate of speed that can be attained. If the sail vessel had to produce the fair wind (astern) within herself, as the steam does, it would be found intolerably expensive, and scarcely to be preferred to a head wind. The highest speeds under canvass have been attained by beam winds. The vessel going before it, if of good model for speed, receives but a slight impulsive force until she approaches her adapted speed, when, if the gale increases, she finds her highest velocity scarcely sufficient to mitigate in any extraordinary, or perhaps safe degree, the violence of the flying force, and she now reels under the pressure which even reduced canvass sustains.

The theory of resistance and propulsion has a fine elucidation in the case of a ship sailing before the wind. A moiety of force will propel her five knots an hour; a moderate increase will double this rate, a gale will treble it, and a hurricane may quadruple the primary speed. The fluid resistance is in proportion to the square of her velocity, until the limit of adaptation is reached, while the propelling power is equal to *this resistance and velocity* under all circumstances. A vessel driven beyond her adaptability, may consume any amount of force that can be applied or sustained, but the surplus must in such case be wasted.

Resistance and Propulsion are compound quantities. The law of fluid Resistance is, that it quadruples when the speed doubles. This must be apparent from the consideration that if the velocity of a ship be doubled, the resistance is, first, twice as great, because of impinging upon a double quantity of water; and, second, twice this amount because of meeting the water with a doubled force; consequently the aggregate increased force of movement is four times the original. The same principle applies to the

inertia (so called) of the ship itself, and which must also be calculated in the sum of Resistance.

The law of propulsion is, the propelling force must be double the fluid resistance, and equal to the sum total to be experienced from it, with the inertia of the ship and friction of machinery, &c. It will be manifest upon reflection, that the propelling force is required not only to withstand the fluid resistance at any instant of time, at any rate of speed, but also to advance the ship at the same rate; in other words, two bodies have to be moved—the displacement and the ship—and of course it requires twice as much force to move two bodies as to move one.

Propulsion must always be greater than mere fluid resistance; for, if it were not, there could be no velocity of the ship; were it removed, she would still remain to be propelled. The *ultimatum* of ship propulsion is velocity, in an economical degree; the fluid resistance is merely a natural incident to this velocity, and all the force used in overcoming it, is an indirect expenditure to no useful purpose. That portion of propulsion which is laid out upon overcoming the inertia of the ship, at any velocity, must be equal for equal weights of vessel, whether driven by wind or steam, or of sharp or full model; hence the importance of a suitable model and just measure of propelling power for whatever speed may be required. Economy in mercantile shipping is thus seen to result from a balance of forces, which it is the province of the Marine Architect and Engineer to create, and in the absence of the application of these principles, the *profitable sailing ship or steamer* is merely the result of "good times" and "enterprise." Competition is a test that luck and guesswork does not always prove equal to.

The duty of propulsion is seen to be two-fold: first, to encounter resistance, and second, to produce speed. The force to produce speed, varies with the square of the velocity, whilst that to overcome the fluid resistance varies also as the square, and hence the entire propelling force varies as the cube. We have before remarked that vessels cannot be forced economically beyond their adapted or *model* speed, and the waste of power in attempting it, is obviously *thrown away upon the model;* for, if it be improved, even less power than that at first applied, may propel the vessel at a higher rate of speed.

That it requires force to communicate motion to a body, even in vacuum, perhaps few will deny. Gravity, or weight, is only the name of a force acting in nature, and the phenomena of gravitation teaches that the density of bodies has well defined relations to velocity produced by whatever force.

From the above analysis of the propulsory power of vessels, it may be seen that we recognize the weight of vessels, as the subject of that portion

of the propelling force which we have described to belong to the production of speed. Not only is this reference correct, but the displacement which represents this weight in terms of specific gravity, bears well defined relations to the resistance of the fluid. To reduce this resistance and the weight of vessels, is therefore to require less propelling force for a given speed. If an increase of speed is sought beyond the usual mark of steamers, the model, propelling force, and machinery must be designed in view of the above principles, or failure may be expected. At present we are not considering the engines, nor the weights of their parts; it is obvious, however, that the same principles prevail with regard to the resistance and speed of the engines, as of the ships.

If we would appreciate how little is known of the Economy of Resistance and Propulsion, it may serve to read the discussions of the British Institution of Civil Engineers, at a recent meeting. We are astonished to find scientific men in that Institution advocating the vagaries of Mr. Armstrong, and the not less untenable position of Mr. Atherton, to say nothing of seriously mentioning the formulas of Colonel Beaufoy and Mr. Hawksley, and the experiments of Bossut, and others. The talk about "midship sections," the "angles" of the "bow" and "stern lines," "friction of water through pipes," "equations for curved forms," &c., &c., is peculiarly significant of floundering in the dark. Let us hope that the spirit of inquiry which that discussion evinced, will be pleased to hail with gladness the ideas that we are now advancing.

What is wanted, is, the perfect form for the bodies of vessels, the models to be adapted to various speeds, and the employment of the smallest amount of propelling power. Every rate of speed has its economical model and saving measure of propelling power. Let the shipowners see that the Marine Architect and the Engineer furnish the *desideratum*. We will show the development of a vessel of 1000 tons displacement adapted to speeds of about 6, 10, 14, 18 and 20 knots per hour.

The accompanying plate, exhibits the figures (in longitudinal and transverse views) of the *elementary solids* of displacement, equal in cubic contents to the immersed body of the ship. The figures marked 6, 10, 14, &c., each represent equal solids of 1000 tons (of 35 cubic ft.) for corresponding speeds. That marked zero, (0) defines the diameter of the globe from which the others are evolved, and is not itself adapted to velocity.

It will be perceived that the law of distributing the displacement operates with particular reference to the degree of speed required, giving elongation to the ship according to fixed principles. In this system of nautical design, *the displacement and speed determine the dimensions of length and area of greatest transverse section.* The ratio of depth to breadth, must in some measure, be regulated by the draft of water, while the water lines

and transverse sections may be evolved with reference to the intended character and service of the ship. We cannot enlarge upon this system now, but hope to publish a complete exposition at a future time, when it will appear that science in Naval Architecture has a substantial foundation in nature. For the purpose of comparing the immersed solids of different vessels with one another, or with a true elementary solid of equal volume,

proceed thus:—Compute the areas of the transverse sections; divide each area by the ratio 3.1416, and extract the square root of the quotient; set off these roots on perpendiculars on each side of a middle line, which shall represent the axis of the solid, the perpendiculars being drawn to correspond with the transverse sections; through the points thus made, sweep in a curve on each side of the axis line, and the greatest section of the elementary solid of displacement will be produced. A revolution of this figure around its axis describes the solid required. The development of the model may now be appreciated by that best of all instruments, the human eye, with which the nautical man is wont to measure and test it. It is surprising with what accuracy some of the gifted shipbuilders of America have approximated the development of perfect proportions in the increments of displacement on their models by the aid of a practiced eye alone. But few vessels, however, have been built of very considerable perfection of form. Yet, with all the short-comings of the Naval Architect, it is our opinion, that models are now in advance of engines, and will always be, until it is fully understood that the displacement, speed, and propelling machinery must each be adapted to the other for the purposes of commercial utility, and measures are taken by owners to secure this result.

THE FOREST AND THE MINE.

WOOD AGAINST IRON IN A TRIAL OF SPEED.

Two yachts are now building by Captain R. B. and J. M. Forbes, of Boston, alike in all particulars of model, bulk, etc.—the one built of wood, the other of iron. It is said that one of the designs of this twin-construction, is to test the merits of wood and iron, in sailing over a given distance in a given time, in order as is supposed, to be able to determine how far vessels are affected in their speed by those materials. The following are their dimensions:—57 feet long, 17½ feet extreme breadth, depth, including trunk, 8 feet, and of 4½ feet draught of water, with furniture and ballast on board. They have center-boards, are pilot boat rigged and raked; fore-mast 57 feet long, main-mast 60 feet, with a bowsprit of 14 feet outboard. The Iron yacht is named *Edith*, the wooden one *Azalea*. This may all be very interesting to yacht clubs generally, but so far as the merits of wood or iron in reference to speed alone are involved, we do not think the experiment can furnish such results as seem anticipated. Almost any other quality could be better tested than the speed of these vessels upon this basis. Their strength, buoyancy, stability, difference in distance

between the centre of gravity of vessel and that of her sails, all interpose, and conspire to frustrate the determination of the question of material in this experiment, and will render any inference deceptive in the extreme. If the relative buoyancy, strength, capacity or stability of the vessels as constructed, were the questions at issue, they might be readily determined; but the speed, however widely it may differ in the two vessels, cannot in any measure, except in friction, be attributable to the kind of materials of which the yachts are built.

SPECIFICATIONS OF A STEAM REVENUE CUTTER FOR THE GOVERNMENT.

(*Continued from page* 164.)

Iron Strapping.—The frame to be diagonally strapped on the outside (unless preferred inside by the Department) with bar iron, the straps extending from floor heads to height of main deck, and be well secured to the timbers. The beams of forecastle and poop-deck to be strapped diagonally with iron on their upper surfaces in such manner as to secure the greatest amount of strength to resist the concussion from the recoil of the pivot guns.

Planking.—To be of oak 4 inches thick at midships, and 8 inches at rabbets, from garboard to planksheer, excepting the garboard, which shall be 5 inches thick, scarphed and bolted edgewise.

Clamps.—To be five inches thick, covering a surface of three feet in depth midships, and tapering to twenty-two inches at ends of vessel.

Ceiling.—Ceiling, together with clamps, to be of yellow pine, clear of sap, and 3 inches thick.

Decks.—To have main, poop, and top-gallant forecastle decks—main deck to have a coaming of yellow pine on each bulkhead beam, to receive bulkheads of white pine seven inches thick.

Beams.—Main deck beams, as well as those of poop and forecastle decks, to be of yellow pine; of main deck to be spaced 5 feet apart, and to be 11 by 12 inches at centre; poop and forecastle beams to be 7 by 8 inches, and spaced 3 feet between centres.

Carlings.—Main deck to have ledges of suitable size, and one carling between beams, which shall have 6 oak knees to each.

Knees.—Poop and forecastle beams to have 4 knees to each. The hanging knees shall be of oak, sided 6 inches; the lodge knees of hackmatack, sided 5 inches. The knees to be well fastened with iron, through bolts both to beams and side; all the through fastening above water-line to be plugged, and to be of such size as is usual in the United States Navy, or as may be regarded by the L'loyd's Underwriter's rules as proportionate to siding size. The lodge and bosom knees of main deck to be sided 6 inches—the hanging knees 7½ inches.

Deck-plank.—The main, poop, and forecastle decks to be laid of white pine, three inches thick.

Waterways.—To be of white pine, 12 by 12 inches, fastened with 6-8 inch iron, with planksheer moulding forming port-sills 5 inches thick on main deck, in wake of solid bulwarks.

Guard-beams.—To extend through and beyond the sides of the vessel a distance commen-

surate with the requirements of the wheels, to be properly secured by braces and tie rods of proportionate size to power of engines and strength required. The form of guard to be such as will chime in fair with the side of vessel on an easy curve, furnishing an amount of surface exposed to the sea only equal to the requirements of the wheels. The guard decks to be laid in alternate strakes of yellow pine, 2½ inches wide and 3 inches thick, and to have a suitable fender on the outside.

Planksheer.—To be bolted into wales and water-ways, and plugged, and a through-bolt in every stanchion, and to have a moulding on both edges, and to be of oak 5 inches thick.

Rail.—To be of oak, 5 inches thick and 13 inches wide, with moulding on both edges; to carry width of 13 inches only in wake of main-deck, and to be bolted diagonally to all the stanchions and timbers with 9-16th inch iron; the rail moulding to be continued across poop and forecastle in capping of grub beam; the waterway of poop and forecastle to extend up to lower side of rail, and rail to be carried quite around, being 7 inches wide on poop and forecastle.

Channels.—Chain plates, channels, and dead-eyes to be of proportionate size, and of most convenient arrangement.

Caulking.—The vessel to be caulked thoroughly, both ceiling, decks, and planking, while on the stocks, and outside to be re-caulked after launching, and—

Coppering—Coppered with 26 and 28 oz. copper, laid smooth on two good coats of varnish and faithfully nailed up to 9½ feet line of flotation; and to have the proper feet marks placed on stem and stern post.

Paint.—To have three coats of oil paint above the copper-line on the outside.

Fastening.—The fastening shall be of kind and quantity such as is approved in the United States Navy, for all parts of the hull, and as follows for the planking, viz: of copper up to one foot above load-line, and above which it shall be of iron, and plugged on the outside, in each case to be square-fastened, one bolt going through in each frame and in each strake, and riveted on composition rings on the ceiling. In addition there shall be through butt bolts, driven and clenched in like manner. The spikes used for drawing the plank to the timbers shall be composition, and great care shall be taken not to check the plank in driving the fastening; at least three-quarters of all the fastenings in the live-oak and locust shall be bolts. The edgewise fastening of garboard shall be driven from each side, and not through and through, and to be of 5-8th inch copper, 2 feet apart.

Coal Bunkers.—To be of plate iron of sufficient capacity to hold a supply of coal for ten (10) days' steaming, to be connected with the deck and to the bottom, where it shall be secured to a keelson in such manner as to furnish a great amount of strength to the vessel longitudinally, and to have angle iron lodgments for receiving lower deck beams, and further secured as specified in the description of engines.

Breast-hooks.—To have one breast-hook to each deck, and one between, bolted through and through.

Butts.—Great care to be taken in shifting the butts in every part of the construction, the arrangements of which to accord with Lloyd's Rules or those laid down in the Shipbuilder's Manual, published by the undersigned.

Bolting.—All the bolts in the vessel are to be faithfully driven, so as not to check the timbers, and all fastenings not specified in detail to be, in size and quantity, in conformity to the rules before named.

Steering.—To have a rudder of suitable size, the stock of which shall be of 16 inches di-

ameter, to be well grown of the best pasture white-oak, and to have copper pipe case for stock, extending from buttock to poop-deck, and to have four rudder braces and pintles of the best composition metal, with a circular groove in the after edge of rudder to prevent trembling. To be steered by an iron tiller under the poop deck, the steersman to stand in a pilot-house of suitable size, situated at the forward part of poop-deck; the steering-wheel to be of mahogany, and wheel-ropes of raw-hide; the rudder to be provided with a clasp tiller band for steering in the cabin in case of accident to the wheel or house; the binnacle to be made of brass, and be furnished with corrected compasses; and all the appurtenances of rollers, chains, blocks, and the proper rudder pennants furnished complete.

Lightning Conductors.—To be fitted with Harris's lightning conductors on most approved plan.

Water Closets.—To have four sets of water-closets, two on each end of vessel, at bulkhead of poop deck and forecastle. The two forward closets to have entrance from main decks on one side for seamen and on the other side for firemen, coal-heavers, &c. Those forward to be sufficient for the accommodation of 100 men, each closet to be divided into two compartments with proper doors and lights, and to have the best pots, with brass valves and cisterns for washing. Those aft to be on one side entered from the cabin, and on the other from the deck, to be fitted up in the best manner; those entered from the main deck to have locks on doors—one to be for Engineers, the other for Lieutenants; those entered from cabin to be for Captain and cabin officers—all to be fitted with cisterns and side-lights of the most approved pattern.

Boats.—The vessel to be provided with four boats, two of them metallic, and all to be life-boats; to have the full complement of oars, with the necessary sails and spare oars, davits, tackles and to be properly nested.

Pumping.—To have suitable pumps, with attachments to engine for pumping each compartment of the vessel by steam power, steam-power shall also be applied for extinguishing fire, weighing anchors, hoisting coal or cargo, working ship, and the pumping force shall be capable of application to a leaking vessel alongside, through the instrumentality of hose and flexible suction hose for such purpose to be provided, also with hose for casting over the ship's side.

Engine Room.—The engine, boiler, and fire-room to be built with plate iron, to form one compartment, with water-tight bulkheads, and provided with slide doors for coal shutes, making this compartment flood and fire-proof.

Iron Bulkheads.—Shall be constructed of plate-iron, to extend from main deck to the ceiling of the vessel at the forward end of poop, and the after end of forecastle decks; to be made thoroughly water-tight, and strengthened by angle iron, with a view to resist hydrostatic pressure, and to give extra strength to the vessel. With this construction the vessel will be divided internally into seven water-tight compartments, by the strongest and most durable bulkheads, making her a life-boat.

Masts and Spars.—The mast steps to be of angle iron, riveted on the top of centre keelson; lower masts of white pine, smaller spars to be of spruce, lengths to conform to accompanying plans, and the sizes to be proportioned to the same.

Rigging.—All the standing rigging on the foremast to be of wire rigging, (unless hemp is preferred by the Department,) and that on the main mast to be of best Russia hemp; the running rigging to be of best manilla.

Ground Tackle.—To have the necessary hawse pipes, two anchors on the bow, with one sheet and one kedge anchor, with all the chains to comply with the usages of the United

States Navy or Lloyd's Rules, together with anchor davits, shoe, chain pipes, well, the most approved stoppers, chain hooks, and all and sundry the conveniences and fittings necessary to handle the anchor gearing with facility, and stow the same in place.

Scuppers.—The necessary deck scuppers, and all other plumbing shall be supplied.

Hatches—Coamings and ledges of main deck hatches to be of mahogany, with the necessary hatch plates and bars to secure the same, and to be provided with the necessary step-ladders, gratings, shot-racks and tarpaulings.

Gun-ports.—To have eight gun-ports on main-deck, as shown in the model, and shutters to be made in halves, with holes cut and tompkins fitted, and hung by brass hinges. To have all the necessary gun tackle and breeching bolts in port-timbers and deck. The batteries to be not less than eight feet long.

Berth Deck.—To be seven feet below the upper deck line, and extends from forecastle to boiler bulkhead, and from coal bunker to poop bulkhead. All parts of these decks not occupied by store-rooms to be made into hatches of convenient size, with beams to ship and unship, and made of yellow pine six inches square.

Rig and Sails.—The vessel to be rigged as a fore topsail schooner, as per plan, the sails to be of such canvass as is used in the United States Navy, and to be made and fitted in the very best manner, and furnished with all the proper number, size, and description of blocks, rigging, and other appliances for working them with convenience, ease, and celerity.

Awnings.—To be furnished and fitted upon suitably adjusted stanchions between the rigging on forecastle and around poop deck, so as to stretch them over the entire vessel.

Brass Railing—Supported by brass stanchions standing in composition sockets, to be extended quite around the poop deck, of convenient height, and on the forecastle deck the railing of similar description to be of galvanized iron fitted to neat stanchions of the same material.

Cabin.—To be finished with black walnut wood, and divided into after-cabin for Captain and ward-room and state-rooms for four officers, with the proper closets and pantries, each state-room to be fitted with berth bureau, with hinged top for desk, drawers under berth' and wash-stand. After Cabin to have two state-rooms, a library and nautical instrument case, a centre-table, bureau, drawers, closets, and furnished with the necessary furniture for occupation. It shall also contain a water-closet and bath-room, the floor to be carpeted, and in all respects fitted, finished, and furnished with conveniences comporting with the requirements of the Revenue service; each state room to be provided with one side-light of the most approved pattern. The ward-room floor to be oil-clothed and furnished with tables and furniture of a suitable description. The Cabin shall be entered from the main deck.

Forecastle.—To have a midship entrance from the main deck into a hall 6 feet long and 4 feet wide. from thence forward, the space to be divided by a longitudinal partition, one side to be fitted with berths, tables, lockers, mess-chests, &c., for seamen, and the other side in the same manner for firemen and coal-heavers.

Capstans, &c.—To have two iron power capstans on poop-deck, and one for handling anchor gearing, &c., on the forecastle deck. Gipsey windlasses to be furnished wherever required.

Store-rooms.—Carpenter's, Boatswain's, Gunner's and sail-room will be located on the forward berth deck, and be fitted with shelves, racks, and lockers in the usual manner of the U. S. Service.

Magazine.—To have one magazine, suitably prepared with drowning cock and to be

sheathed with zinc—the location to be under the Captain's cabin, and the entrance through a hatch in the floor.

Safe.—The light room of magazine to contain a bullion safe.

Hammocks.—The berth deck and ward-room beams to be furnished with hammock hooks. The main rail to be supplied with composition sockets for double stanchioned hammock-rails, stanchions and rail of galvanized iron. The hammock cloths and bags to be furnished for 50 men, more or less, as the Department may determine.

Mess Chests—and tubs for a like number of men to be provided.

Galley.—To have sufficient capacity for cooking for 100 persons, and to be furnished in a suitable manner.

Hot Air Closet—for drying cloths and airing linen, to be situated near the galley.

Baths.—There shall be one bath-room in the after cabin and one in the ward-room, adjoining state-room and water-closet, fitted with the proper cisterns and pipes, the cisterns to be provided with valves to prevent an influx of the sea, the latter to discharge into water-closet pipe, which shall also be fitted with valves; two other bath-rooms to be fitted, one in each division of the forecastle.

Lights.—One mast head and two signal lights to be provided, and a calcium light placed over the pilot house, of sufficient power to show vessels at sea for several miles in an ordinary dark night. To have a flush sky-light on poop-deck, made of heavy plate glass for lighting after cabin and ward room, and to have two conical deck-lights in forecastle deck on each side.

Bells.—To have a 14 inch polished brass bell, with ship's name mounted on ornamental cast iron brackets, over engine house and between the wheel-houses; also, the necessary gongs and bells, with their connections for communicating from the pilot house to the engine-room.

Wheel-houses—and all joiners' work pertaining to them to be fastened with galvanised annealed nails; also, the fastenings about pilot-house of the same material, unless copper be preferred.

Fog Whistle.—To have a large fog whistle, with seven inch bell, with ebony or lignumvitae handles.

Engine Room.—To have a house on main deck, covering the engine cranks, and extending forward sufficient distance to make engineers' rooms, with steward's, cook s, and other convenient apartments, with entrance to engine from within or without, and to be lighted with heavy plate glass from the top; the engineer's room to be lighted by windows in the side with plate glass, and glazed, and suitably furnished with berths and all proper conveniences for occupation.

Fire-Proof sheet iron lining shall cover all wood work over the boilers or engine-room exposed to fire or heat, to be painted with two-coats of red lead.

Gangways.—To have a gangway on each side, on after part of guards, with the necessary accommodation ladder extending from guards to within a proper distance of the water, with all other requisite conveniences, stanchions, &c.

Hand Rails.—Man ropes, and steps on deck, also to have steps leading from main rail at gangway quite over the top of wheel-houses, with proper man ropes. Also to have suitable steps and man ropes for ascending and descending the poop and forecastle, and the engine-house, and like conveniences for communication with the berth deck, and whenever required on board.

Ventilation.—The forecastle, engine, and fire-rooms, and between decks to be ventilated by and from a galvanized iron funnel and pipe in the bow, at the usual locality of the bowsprit, fitted with a shutter for closing—the ward-room and cabin to be ventilated in like manner from a funnel in the brake of poop-deck.

Warming.—All parts of the ship to be warmed by steam conveyed in suitable pipes, and provision to be made whereby the air entering the cabins and other apartments may be heated or cooled.

Gas Generator and Pipes.—To be furnished with a gas generator of sufficient capacity for lighting the whole vessel internally, with the necessary pipes leading to the forecastle between decks, engine-room, and cabins, and fitted with suitable burners, &c.

Arm Chests.—To have two arm chests in the cabin and ward-room, provided with brass locks and hinges, of sufficient size to contain arms for the entire ship's company. Saddles for boarding pikes to be fitted around the masts, and the requisite lockers for shot to be prepared under berth deck.

Upholstery.—Of suitable description for the service of the ship shall be furnished entire and complete, and in style corresponding with the usage of the U. S. Revenue Service.

Medicine Chest.—To be supplied.

Bending Sails.—The sails to be bent and furled, and in all respects fitted and prepared for immediate use.

Table Ware and furniture, cooking utensils and all other things necessary for use and comfort on a sea voyage, excepting only fuel and provisions.

Log and Leads.—To be furnished with an improved velocimetre, chip log, and leads, with all the fittings complete and in order.

Water.—Suitable pumps to be situated in convenient parts of the vessel for drawing water from the keelson tank.

Harness Casks.—In number and capacity as may be required to be furnished.

Decorations.—Externally and internally to be of a tasteful style, and all the painting to be neatly executed, and the colors to be such as may be chosen by the Department.

Nautical Instruments—suitable for the navigation of the vessel, to be furnished, chronometers only excepted.

Trial Trip.—Fuel to be furnished for one trial trip, which shall be made before delivery to the Department.

Sundries.—Should it occur that any work, materials, or things are found, before delivery to the Department, to be wanting and essential to the full and complete preparation of the vessel for the service intended, and which are not specially enumerated in these specifications and those of the engines accompanying them, attached hereto, the deficiency shall be made good; and should there arise any question as to what should be deemed necessary to supply, to finish, or to complete in the construction and equipment of this vessel in order to fulfil the spirit and letter of these specifications, such question is to be settled by arbitrators, named by each party to the contract, and if these cannot agree they shall name a third person, whose decision shall be final and binding.

Meta Centre, above centre of gravity of displacement by calculation, (S 2-3 y^3 d x) is 12.494 feet.

Meta Centre, above load line, 9.377 feet.

Moulded area of midship section, 224.87 sq. feet.

Centre of gravity of displacement, abaft of midship section, 2.324 feet.

WEIGHTS.

		TONS.
Weight of	Hull, with appurtenances,	270
"	" Engines, boilers, and coal-bunkers,	195
"	" Coal for cruise,	155
"	" Armament on board,	12
"	" Water for ship's use,	9
"	" Provision and stores,	11
"	" Boats and appendages,	5
"	" Officers, crew, and baggage,	8
	Total,	660

CLIPPER AND IRON SHIPS.

It has been the opinion of some that the Clipper has done nothing toward the advancement of the art of ship-building. We are not, however, among the number of those who think so. It cannot be denied that there has been more wealth wasted in clipper-ships, by an improper distribution of their form and materials than by any other consideration; diminished capacity has not always been fully compensated by short voyages; this, however, does not apply to all clippers. In embarking upon the clipper era, ship owners and ship builders seem to have forgotten the very principles of utility, couched in the fact that the farther distant the stern and stern-post, the weaker the vessel. It had not then occurred to them that along the line of keel and keelson, was the weakest part of the ship, and that the longer, the weaker the vessel, inasmuch as the greatest bulk of cargo must be carried upon the least proportionate amount of material; it had not then occurred to them that an iron keelson could be furnished without scarphs and buts, and of any required strength, without diminishing the capacity of the hold; and when the suggestion was made of furnishing a more mixed construction of iron, it was rebuked by a reply that the vessel might as well be built of iron; as well might spikes and bolts be shut out of the vessel on the same ground. Even iron vessels must have an ad-

mixture of wood in their construction, and we say that an iron or a wooden vessel entire is out of the question. In this conntry the day is somewhat distant when iron will or ought to be substituted for wood, unless in particular cases, or on fresh water rivers and lakes. The iron vessels of England are no criterion for us; the ship building iron they use, is inferior to such material in this country, although approved by the Lloyds and, and is really unfit for ship building. With their cheap iron, and cheap labor, the British can perhaps build an iron vessel cheaper than one from wood, and by *puttying* the butts, give them a passable appearance.

FIRST VOYAGE OF THE UNITED STATES FRIGATE NIAGARA.

On the 24th of April, 8 30 P. M., the frigate *Niagara* left Sandy Hook, and stood on her course for the Thames, England. Propitious weather attended her until the 3d of May, when heavy weather set in, which lasted two or three days and terminated in head winds. It was of sufficient severity to test the sea qualities of the ship, which were admitted to be of the highest order by all her officers. The pitching motion is considerable, and the tremor which is usually experienced by vessels when struck by a heavy sea, is not felt. She is remarkably stiff when under canvass; yet is not free from rolling in a heavy sea; the main cause of this lies in her too great dead rise of floor. Captain Hudson used her canvass with caution, owing to defects in the iron-work of the rigging, which proved to have been manufactured from material of very inferior quality. Another source of difficulty incident to every new ship, and especially thoso rigged in the cold season, was experienced—the rigging stretched greatly. It is said by newspaper commentators that her spars are too light and made of poor material, but this is not the case; the difficulty lies in the rigging and iron-work of the same.

Spars are not expected to stand without support: if they were, then rigging would only be superfluous. Justice to her lamented constructor, the late George Steers, requires that the source of misfortune in the iron-work be pointed out, that the responsibility be placed where it belongs. The iron was of worthless quality, and no blacksmith could make good work from it. On overhauling the last Report of the Secretary of the Navy, we find that a party in this city, Messrs. Storer and Stephenson, furnished the supplies of metals for the Brooklyn Navy Yard during the period of the *Niagara's* construction. These supplies were furnished by contract on the *cheap* or *lowest bidder system.* The materials were accepted by the inspecting officer, and they were quite beyond the control

of any naval constructor in the premises. Constructors at the Navy Yards have to use such materials as are furnished. Wooden materials are always more carefully inspected than metal, while cheating is more easily done in the latter.

The largest day's run of the *Niagara*, was equal to 300 mil s. The greatest average speed for a considerable number of consecutive hours under steam and canvass—the propeller making only 44 revolutions—was, 14 knots, and 13 knots by the wind, consumption of coal about 56 tons per diem. Under sail alone with above disadvantages, she has logged 13 knots. On short times, the maximum attained, was about 15 knots. Under steam alone, about 11 knots is the best yet performed. Her propeller can be worked up to about 60 revolutions, and a fair consumption of coal would be about 75 tons per diem, so that the maximum speed of the *Niagara* has not yet been reached. The Engines reflect credit upon their constructors for the manner of performance, and were the chain and other iron parts of the rigging work manufactured of first class materials, in a workmanlike manner, a full measure of credit could be awarded to this noble ship. It should be remembered that like the other new frigates, her steam power is only designed as "auxiliary" to her sails; her performance under canvass alone, will always show a higher result than under steam alone, the model being better adapted to fifteen or 16 knot speed, than to ten or eleven.

One of the most enlightened officers of the Navy writes us, "It is to be hoped the real issue involved in the *Niagara* will be held to the public view—that I take it, is *the* model; the internal arrangements of all kinds can always be made suitable. The objections that are usually put forth to this ship, are the number of guns or style of battery—space between decks, &c.; thus the main consideration is slurred over: for, if the form be correct, the capacity can always be made to accommodate the freight—whatever it may be—guns and men, or merchandize. Therefore, if the *Niagara* carries with speed and ease to herself, she meets the condition proportionably, it being, I presume, within the builder's art to re-distribute the weights so that the ship may have a gun-deck battery and yet sacrifice neither speed nor ease."

From another correspondent we have received the following anonymous note; it is from Washington, and we have no idea of its author. We take this occasion to say, that we wage no war upon personal grounds in any quarter, and cannot in our editorial capacity undertake to determine the "motives and source" of newspaper correspondence.

"EDS. 'NAUTICAL MAGAZINE.'—The motives and source of the enclosed pitiable jubilation are so *transparent*, that I hope you will shew up their

hollowness with your usual spice. The lamented Steers would have been Chief Naval Constructor, had he lived—hence the latent venom of the enclosed remarks: they are afraid of him, *even in his grave.* Pray apply the lash where it will sting, and oblige

AN AMERICAN."

The "enclosed remarks" were clipped from the Washington *Union* newspaper, and were over the signature of "X. Y. Z",—the three last letters in the alphabet—indicating the locality of their author, in the rear ranks of progress. The communication appears in reply to some floundering animadversions of another newspaper, the "*Times*," of New York, which, in casting opprobrium upon the superfine undertakings of "Uncle Sam" generally, particularly condemned, the "worthlessness" of the *Niagara's* spars, and the "insecurity of her rigging," imputing to the Navy Department the blame in the premises. "X. Y. Z." ventures to snow his hand as follows:—

"We deem it but fair to state, in advance of results, that the *Niagara* did not emanate from the Navy Department, but, on the contrary—as we have reason to believe—was, forced upon the department by irresistible outside pressure; therefore, as the department cannot take credit for any excellence this ship may display, it must be held equally above reproach for her inefficiency. The model of the *Niagara* submitted by her constructor, though presenting admirable points, and most especially designed for the attainment of high speed, did not meet the approval of the constructors at Washington, and the arrangement of her decks and disposition of her interior was at variance with the general views of the navy. Her spars, as well as everything else about her, were draughted by the same hand, excepting only the engines, which were built by contract.

In fact, all that the Navy Department has had to do with the *Niagara*—namely, to appoint her crew and officers—has been well done; for her commander has most wisely considered the success of the mission in which she is now engaged, of too great importance to the nation to be hazarded by testing to the utmost the power of her machinery or the endurance of her spars, both of which had intimated by strong symptoms that they required nursing.

A perfect steam-frigate is not to be improvised; it is a problem which has long engaged the minds both of Europe and America, and its solution can only be approached with any probability of success by profound study, enlightened by long and varied experience; therefore, in departing *suddenly and widely* from the path of safe precedent, in attempting, at the cost of more than a million of dollars, the creation of a "full-powered steam-frigate," we appear to have been in rather too *great haste* after perfection; nevertheless we hesitate to blame the step; for, although it may have been injudiciously taken, it was in the right direction, and will at least result in teaching the nation what it would not otherwise have believed—viz: that the construction and equipment of ships-of-war, in this age of the world is a "*specialite*," demanding for its successful application high attainments and long experience, and that it no more conclusively follows because a man has built a world-renowned "clipper," that he can build a successful frigate, than that he who has built a good rail-fence is, as a consequence, qualified to construct a railroad.

In conclusion, we must say that it would be very premature and unjust at this time to

express any opinion of the *Niagara;* that she has fine qualities we cannot doubt, and most sincerely do we hope that an experiment in naval architecture made at such vast expense, may not be without valuable results to our marine. We are assured that at the earliest convenient season, she will be thoroughly tested, and the excellences of her model fully developed; but this can only be done, according all accounts, after she shall have been sparred and rigged upon different principles. X. Y. Z."

The snare of credit which the Navy Department can properly take for the efficiency of the *Niagara*, appears rather limited, if "X. Y. Z." is correct; to screen it from "reproach" for her "inefficiency," is entirely gratuitous. So far as the hand and head of GEORGE STEERS was employed on her spars, we shall have to look beyond the Navy to find greater perfection, while we have already shown the cause of all the difficulty to lie in the rigging and top iron work. It is certain, however, that the sailmakers did not find occasion, and assume the responsibility (with permission to do so) of altering the draft of sails, as was done in one of the other frigates of the Navy.

It is remarked that the engines were "built on contract," but the Department cannot be allowed to dodge the responsibility of their design, including the "auxiliary" feature. The *Niagara* is not a "full powered steam frigate;" in this respect no "wide departure" from "precedent" has been made; were it not that her constructor made an endeavor to supply the defficiency of steam power, by giving an undue proportion of canvass, the performances of the *Niagara* would have been far less respectable than they are.

But the extremity of the alphabet thinks the step of constructing this frigate was in the "right direction," and the nation will be brought to its senses by imbibing the wisdom that, "the construction and equipment of ships-of-war, is a *specialite*," &c. So we think, and the experiment of confiding the construction of the *Niagara* to a renowned yacht-builder, was all the more interesting considering the circumstances, she being the only ship of considerable size he had ever built, and the first ship-of-war. We will place the maiden effort of GEORGE STEERS against the works of Naval Architects in the old world or the new, who have the advantage of bringing to their aid all the "profound study, enlightened by long and varied experience," which they may, without hesitation or fear as to the result of the comparison; and we will ask, "if these things be done in the green tree, what shall be done in the dry?" And if genius, naked, friendless and alone, be able to cope with the armed sages of naval science, what measure of capability would she develop when placed on level ground with "X. Y. Z." competitors?

ANNUAL REGATTA OF THE NEW YORK YACHT CLUB.

We publish the following report of the Regatta Committee for the Annual Regatta, which occurred on the 4th of June. This Regatta was one of unusual interest; the weather was propitious, and the sailing spirited. There were twenty-one yachts entered, viz. :—

1st CLASS.

Name.	*Entered by*	*Rig.*	*Ton'ge.*	*No. of Men allowed.*	*Sq. ft. of Canvass.*	*Start.* M.	S.
Widgeon,	D. M. Edgar,	Schooner,	101.9	26	*3,072.24	25	21
Julia	J. M. Waterbury	Sloop	83.4	21	3,407.24	19	46
Haze	M. H. Grinnell	Schooner	87.2	22	*3,542.50	17	31
Silvie	W. A. Stebbins	Schooner	105.4	26	*3,784.05	13	29
Favorita,	A. C. Kingsland	Schooner	138.	35	*4,593.50	—	—

2d CLASS.

Name.	*Entered by*	*Rig.*	*Ton'ge.*	*No. of Men allowed.*	*Sq. ft. of Canvass.*	*Start.* M.	S.
Rowena	M. W. Bacon	Sloop	40.5	12	2,368.25	14	48
Ameriea	D. C. Kingsland	Schooner	69.5	20	*2,701.97	7	51
Madgie	R. F. Loper	Sloop	89.3	26	2,773.77	6	21
Undine	L. W. Jerome	Sloop	44.	18	2,788.83	6	08
Sea Drift	J. S. Holbrook	Schooner	63.7	18	*2,828.83	5	12
Una	W. B. Duncan	Sloop	67.5	20	3,061.21		22
Minnie	W. H. Thomas,	Sloop	59.1	17	3,066.18		15
Irene	J. D. Johnson	Sloop	57.8	17	3,078.40	—	—

3d CLASS.

Name.	*Entered by*	*Rig.*	*Ton'ge.*	*No. of Men allowed.*	*Sq. ft. of Canvass.*	*Start.* M.	S.
Luckey	C. F. Morton	Sloop	15.2	5	1,505.18	17	27
Margaret	J. Simonson	Sloop	25.2	8	1,692.75	12	58
Island Fawn	C. T. Cromwell	Sloop	17.2	6	1,753.69	11	04
Edgar	H. A. Denison	Sloop	17.3	8	1,819.60	9	25
Ray	R. H. Thomas	Sloop	30.8	10	1,843.15	8	49
Richmond	C. H. Mallory	Sloop	27.4	9	1,845.61	8	46
Wavelet	D. T. Willetts,	Sloop	31.6	11	1,864.53	8	17
Escort,	D. L. Lawrence	Sloop	33.	11	2,196.10	—	—

The Ray and Wavelet, of the 3d Class, did not start.

In consequence of the force of the wind in the morning previous to starting, and the run of the tide at starting, it was decided that the start should

be, with all sails on deck, and that all allowances of time would be given upon coming in.

The yachts were therefore started in classes; the times of starting, together with that of their turning the stake-boat off Long Island, and the buoy of the Southwest Spit and arrival, are given in the following table:—

Yachts.	*Started.*			*Stake Boat at Long Island.*			*Buoy of S. W. Spit.*			*Stake Boat at Elysian Fields.*			*Order of Arrival.*
	H.	M.	S.	H.	M.	S.	H.	M.	S.	H.	M.	S.	
1st CLASS.													
Widgeon	10	52	00				12	56	10	3	57	00	6
Julia				11	48	14	12	48	15	3	48	47	4
Haze				11	50	00	12	47	00	3	45	45	1
Silvie				11	52	42	12	49	15	3	48	40	3
Favorita				11	52	40	12	48	55	3	46	04	2
2d CLASS.													
Rowena	10	45	00				12	50	50	4	2	45	15
America							1	05	25	4	8	38	16
Madgie				11	48	13	12	53	45	3	56	29	9
Undine							1	03	15	4	07	34	19
Sea Drift							1	05	02	4	7	9	18
Una				11	44	00	12	44	00	3	51	14	5
Minnie				11	45	00	12	47	05	3	54	13	7
Irene				11	48	00	12	50	05	3	56	40	10
3d CLASS.													
Luckey	10	40	00	11	44	00	12	52	05	4	1	8	14
Margaret							11	52	34	3	8	49	17
Island Fawn				11	46	10	12	51	26	3	58	31	13
Edgar				11	41	30	12	46	20	3	56	46	11
Richmond				11	41	00	12	46	00	3	57	17	12
Escort				11	42	50	12	44	28	3	54	50	8

EXTRA SAILS.

FIRST CLASS.

The *Favorita* set fore and main gaff-topsails, flying jib and staysail, the areas of which are 1,617.86 square feet, equal to 26 min. 58 sec. The *Haze* set fore and main gaff and jib topsails, flying jib and staysail No. 1, the areas of which are 1,987.69 square feet, equal to 33 min. 7 sec. The *Silvie* set fore and main gaff-topsails and flying jib, the areas of which are 1,145.07 square feet, equal to 19 min. 5 sec. The *Widgeon* set fore and main gaff and jib topsails and flying jib, the areas of which are 1,205.55 square feet, equal to 20 min. and 5 sec.

SECOND CLASS.

The *America* set main gaff topsail and staysail, the areas of which are 491.7 square feet, equal to 10 min. and 14 sec. The *Sea Drift* set main gaff topsail and staysail, the areas of which are 694.32 square feet, equal to 14 min. and 28 sec.

All the above yachts being schooners, the deduction of ten per cent. from the area of their sails is here made. These times being added to the time of starting, will give the following corrections:

FIRST CLASS.

Favorita*	0 00	Widgeon	32 14
Julia	46 44	Haze	11 22
Silvie	21 22		

SECOND CLASS.

Sea Drift*	0 00	America	6 52
Irene	9 16	Minnie	9 31
Una	9 38	Undine	15 18
Madgie	15 37	Rowena	24 04

* The times of the Favorita and Sea Drift being zero, in their classes, no addition for extra canvass is here made.

This allowance of start being deducted from the time of sailing, will give the order of speed of each yacht, not only in each class, but in the classes combined.

Name.	*Time of Sailing.*			*Allow'ce of start.*		*Net time.*			*Ord. class.*	*Ord. speed.*
1ST CLASS.	H.	M.	S.	H.	M.	H.	M.	S.		
Julia	4	56	47	46	44	4	10	3	1	1
Widgeon	5	01	00	32	14	4	28	46	2	2
Silvie	4	56	40	21	22	4	35	18	3	3
Haze	4	53	45	11	22	4	42	23	4	4
Favorita	4	54	04	0	00	4	54	4	5	6
2D CLASS.										
Rowena	5	17	47	24	4	4	53	4	1	5
Madgie	5	11	20	15	37	4	55	52	2	7
Undine	5	22	34	15	18	5	7	16	6	12
Una	5	6	14	9	38	4	56	36	3	8
Minnie	5	9	13	9	31	4	59	42	4	9
Irene	5	11	40	9	16	5	2	24	5	10
America	5	18	38	6	52	5	11	46	7	17
Sea Drift	5	22	9	0	00	5	22	19	8	19

3D. CLASS.

Luckey.........5	21	3......17	27......5	8	36......1......11
Edgar...........5	16	46...... 9	25......5	7	21......2......13
Island Fawn.....5	18	31......11	4......5	7	27......3......14
Richmond.......5	17	17...... 8	46......5	8	31......4......15
Margaret........5	23	49......12	58......5	10	51......5......16
Escort..........5	14	50...... 0	00......5	14	50......6......18

PROTESTS.—The owner of the *Haze* submitted protests against the *Julia* and *Favorita*, for passing to the westward of a buoy claimed to be on the West Bank, and against the *Minnie*, for fouling the *Haze* in turning the buoy of the Southwest Spit.

The owner of the *Island Fawn* protested against the *Luckey*, upon the supposition that her sails were of greater area than that by which her allowance of time was computed.

It was submitted, also, to the Committee, that one yacht had passed to the westward of one or more buoys of the West Bank, and that another, in luffing up under the lee of a third, compelled the latter to luff up and finally to lie to windward of her course, to avoid being crowded to the westward of a buoy, to the eastward of which, she was compelled to pass by the regulations.

Although the time had passed within which protests could be received against the sailing of a yacht, the Committee felt themselves not only justified, but called upon, before awarding the prizes, in vindication of the integrity of the Club and the justice of their decisions, to consider any facts coming to their knowledge which ought to affect their award.

All the parties interested having been notified to appear before the Committee, and all the cases being considered, the following conclusions were arrived at:—

1st. The regulations issued by the Committee for the government of the Regatta declare, "in going and returning, all the buoys *on the West Bank* are to be passed to the eastward;" and as it was conceded that the *Julia* and *Una* did pass buoy No. 9 to the westward, the question then arose, was this buoy one of those included in the regulations.

On the part of the owners of these yachts, it was alleged: 1st. That this buoy was not a buoy of the Bank; 2d. That it was known by the pilots as a buoy on *a knoll to the southward* of the Bank; that there was a channel inside of it, to the northward; and 3d. That, as they were compelled to employ pilots to guide their yachts upon that occasion, that the interpretation of pilots at large, of pilotage directions, should be taken as conclusive as to the application of the rule.

On the other hand, it was argued by the parties who protested: 1st.

that this buoy was strictly a buoy on the Bank, it being upon the southernmost limit of it, and upon the western confines of the channel; that in its construction, color and numbering, it was like the acknowledged buoys of the West Bank, and that it was so considered by the Government officer at this station, who has them in charge.

In the deliberations of the Committee, it appeared: 1st. That in the opinion of Professor A. D. Bache, Superintendent of the United States Coast Survey, this buoy was held by him to be a buoy *of* the West Bank; 2d. That from communications with a large number of pilots, (eighteen in number,) that they, without a dissenting voice, declared that buoy No. 9 was *off* of the Bank; 3d. That it was upon a different bottom from that of the Bank; 4th. That there was a channel inside of it, and that the pilots did not know it as a Bank buoy; and further, that there was no advantage derived from the course held by these yachts.

In view, then, of the elements presented, the Committee entertain the opinions—

1st. That although buoy No. 9 is, in the opinion of the Chief of the Coast Survey, a buoy of the West Bank, and that it may be, hydrographically, yet, that with pilots, seamen and baymen, it is known as a buoy *off* of the West Bank; further, the lettering of that Bank upon the Coast Survey charts, the location ef the buoy, the character of the bottom there, and the existence of a channel inside of it, are all of a character calculated to render that buoy equally as much a channel buoy as a buoy of the Bank.

2d. That there was no advantage to be anticipated or gained in passing to the westward of this buoy, in preference to the eastward of it; that it was passed by the owners of the yachts, under the opinion supported by the unqualified assurance of their pilots, that it was not a buoy *on* the West Bank, nor was it ever understood to be one.

3d. That as it was necessary for the owners of yachts to employ pilots, they should not suffer from the terms of the sailing regulations conflicting with the general understanding of the pilots; if the regulations are held to be ambiguous or imperfect, the error is with the Committee, and not with the owners of the yachts.

They decide, therefore—

1st. That yachts *Julia* and *Una* did not, as claimed by the protests, conflict with the purpose of the sailing regulations, viz.: that of passing to the eastward of a buoy on the West Bank, whereby an advantage might be had in running out of the set or strength of the tide.

2d. That the protests against the *Favorita* and *Minnie* being with-

drawn, the re-measurement of the sails of the *Luckey* showing their area to conform to that under which she entered, and the charges against the other yachts not having been formally substantiated, that their claims to be placed in the Regatta are no wise forfeited.

Finally, That the prizes in the several classes were respectively won by the *Julia*, *Rowena* and *Luckey*, and that the *Widgeon* is the winner of the prize for the schooners of the first class.

In conclusion, the committee recommend to the Club, that in future sailing regulations, for the same course, that the buoys of the West Bank be specified by numbers, as numbers 11, 13 and 15; and that all yachts entering for a Regatta shall be provided with two pieces of canvass, on which shall be painted, in red, their number on the list of entries, one of which their owners be required to secure on each side of the mainsails of their yachts

CHAS. H. HASWELL,
J. HOWARD WAINWRIGHT, } *Regatta Committee.*
ROBERT O. COLT,

To N. BLOODGOOD, Esq., Secretary New-York Yacht Club.

THE BOILER CONTROVERSY—AMENDMENTS.

MESSRS. EDITORS:—Our article in the last number having been prepared in great haste, we are forced to call attention now to certain errors and omissions therein overlooked.

First, we would give the postscript of U. S. Eng. Adams' letter:—"I forgot to say, that I found the pine plugs easily lasted six months, without giving any trouble when properly put in. Also, I never let the water in the boilers get above 1 3-4 density, which kept them free from scale. Our average point of cutting off was 5 feet, the stroke being 7."

Messrs. Hecker & Brother also add that, "we have put up several sets of your boilers—some of them large size; the last to drive six High Pressure Engines, using steam of from 90 to 100 lbs. pressure. Those last named, work equal to the first."

We would also insert the letter from Capt. Stoddard, of the *Lafayette*, to which reference was made. He writes thus:

"January, 1857.

Gentlemen: Having been often questioned as to the value of the Montgomery Boilers on board the screw steamer '*Lafayette*,' under my command, I reply that they are the very best I have ever seen, for the follow-

ing reasons: - First, they are more compact, and weigh much less than those in common use; the economy of fuel was very great on the '*Lafayette*,' as we averaged but about $\frac{1}{3}$ ton the hour to fill our two cylinders of 46 inches bore to 42 inch stroke, filling our cylinders about two-thirds full of steam of an average pressure of about 35 pounds to the inch. We used nought but sea-water, and found no difficulty from scale. Our Engineers found the water very solid, and the steam dry. We had no difficulty as to repairs; the Boilers showed evidences of great durability. We could make from 12 to 13 nautical miles the hour, which is the best running for the coal burned, I have ever known at sea. I know others who have used these Boilers with equal results. With such experience, I have no hesitation in saying I would prefer them for *every purpose*, before any Boilers I have ever heard of."

Also, on page 224, ninth line from bottom, instead of "7,630," read "less than 5000;" and on page 223, in referring to the set of drawings made by Mr. Montgomery, an omission was made, in not stating that these drawings can be seen at his office. ENGINEER.

THE SMALLEST STEAMBOAT IN THE WEST.

THE steamboat "*J. Bissell*," plying as a regular packet between St. Paul and Mineapolis, in Minnesota, is perhaps the smallest diameter of her class on the waters of the Mississippi. She was built upon the head waters of the Ohio, by Capt. John Hart, and is of the following dimensions: Length over all, 90 ft.; beam 13 ft.; hold $2\frac{1}{2}$ ft.; draft of water light *nine* inches. Her propelling machinery consists of one boiler, and an 8 inch cylinder with two ft. stroke. The crew of Capt. Hart is composed of two men and one boy. He accomplished the trip from Pittsburgh to St. Louis, in less than 30 days, never running during the night, and slackening her speed at all places of dangerous navigation. Her master has a penchant for small boats and long trips.

About eight years ago he took the command of a diminutive craft at Pittsburg, steamed down the Ohio and the Mississippi to New Orleans; from thence through Bayou Plaquemine, to Vermillion Bay, on the Galveston coast, and up the Brazos river. Capt. Hart, his small boat, and his small crew, excited much interest up the Brazos, being the smallest establishment of the kind ever seen there.

GALES ON THE ATLANTIC.

We have just received a copy of Maury's new Wind and Current Charts, showing the gales prevailing in the North and South Atlantic in every month of the year. This work will prove of incalculable value to mariners navigating these stormy seas, and while it adds another page to the history of scientific achievements, will doubtless be widely sought by those whose home is on the deep. The following explanatory remarks from Lieutenant Maury, prefacing the book of Charts, will doubtless be read with interest.

"The plates are the Storm and Rain Charts (Wind and Current Series) expressed in colors and addressed to the eye. They are designed simply to show the relative frequency of gales during each month in various parts of the Atlantic ocean North and South.

They are compiled from the abstract logs of the Observatory, and embody the results of 265,292 days of observations.

These observations show, that in those parts of the ocean which are colored purple, a gale of wind is recorded at least as often as one in every six days, and so on for the blue and pink as per explanation on the plates.

In those parts of the ocean which are not colored, the logs show that a gale has been encountered as often on the average as once a fortnight. It should, however, be borne in mind, that the absence of those colors does not necessarily indicate a tranquil sea; many and probably stormy parts are left blank for the want of observations. Take the plate for January by way of illustration. The abstract logs contain few or no records on the polar side of the colored spaces either in the North or South Atlantic. The waters on the Polar side of these spaces lie in anti-commercial regions of the sea; none of the frequented routes of trade lead through them, and our information therefore, as to the frequency of storms in them, is simply negative.

On the equatorial side of those colored spaces, on the contrary, our information for the most part, is abundant, and it shows that however severe the tornadoes and hurricanes of the intertropical seas may be, they do not occur on the average as frequently as the storms of extra-tropical seas.

The limits of the stormy regions are traced with a free hand. Owing to the manner in which the gales are "got out,"' this must be so. Each one of the parallelograms made by the intersection of the five meridians with the five parallels of latitude, is called a *field*, and all the observations that are made by vessels during their passage through any one field, are

grouped together, and whether these vessels happen to pass through one corner of the field only, or through all parts of it, the observations are held to give character to the whole field.

But certainly the storms in their ragings are not confined by the sides of imaginary figures or arbitrarily described parallelograms. Nevertheless, for the sake of connecting one stormy parallelogram with another, *the outlines* of a stormy region have often been arbitrarily drawn. Take the Eastern end of the purple in the South Atlantic for January as an illustration. It so happens that we have but few observations in the field between the meridians of five° and 10° West, and the parallels of 40 ° and 45° S. In the field of the East of that, the records were more abundant; they mention eighty-two gales in 489 days. Should the former field be left blank because there are not so many observations in it?

With this explanation, we are surprised to see how very much more stormy are some months than others, how tranquil the trade wind regions are, and how very much more boisterous is the North than the South Atlantic.

At no season of the year can the passage around either of the "Stormy Capes," as poets call them, vie for storms with the winter passage between England and America.

I have gone into an investigation of the abstract logs for the purpose of ascertaining the most tranquil and favorable time for laying the Sub Atlantic Telegraph, with reference to gales, fogs and ice. The season that presents the most favorable combination of these, is also the most favorable season for passenger travel across the Atlantic, and that season is found to be about the last of July and first of August. This part of the ocean is most tranquil in summer. Taking averages, we have in it fewer gales, but more fogs and ice in June than in July or August, but fewer fogs and least ice in August. The last of July and first of August appear to be the most favorable time for laying the Sub Atlantic Telegraph. This information may be useful to invalids and others crossing the Atlantic, as well as those engaged in this enterprise.

These plates are obviously suggestive. They are the fruits of a beautiful system of physical researches in the prosecution of which the leading nations of the world are vying with each other, and they are respectfully submitted as a small mite among the many offerings that are daily cast into the common treasury, which I hope soon to see so enlarged, that it will comprehend the results of a like system of co-operation and research for the land also. M. F. Maury.

Observatory, May, 1857.

SHIPPING REVIEW.

FREIGHTS IN JUNE.—At the opening of this month freights remained depressed, with no material change in rates.

By sailing vessels to Liverpool, Flour, 6d. *a* 9d.; Rosin, 6d.; heavy goods, cheese, &c., 10s. *a* 15s per ton; Grain 2½d *a* 3d. To London and Havre, rates ruled proportionably.

June 10.—The market continued dull, but with uniform rates; we note grain to Liverpool at 2½d by a sailing vessel, while 4½d was paid to the English screw-steamer, *City of Washington*. To Melbourne, 200,000 feet lumber *a* $25, and measurement goods at 25c.

Charters.—A barque 470 tons, from Marseilles to New-York, $2,000; a brig from Wilmington, N. C., to Havana, lumber, $12; one from St. John, N. B., hewn timber, $12; a schooner 170 tons, to Prince Edward Island, flour, 35c.; thence from Pictou to Wareham, coal, $4 per chaldron; one 238 tons, to St. Domingo and back, $1,700; one 160 tons, to Port-au-Platt and back, $1400.

June 17.—The market continues extremely dull, and the depression is more general than ever before known in times of peace. The offerings are very light in every direction. To Liverpool, Cotton, 1-8d.; Flour, 6d. *a* 9d.; Rosin, 9d.; heavy goods, cheese, &c., 7s. 6d. *a* 12s. 6d.; Grain, 3d. *a* 3½d.; Beef, per tierce, 6d. To London, Cheese per ton, 20s. *a* 25s.; Oil Cake, 10s. *a* 12s. 6d; Flour per bbl, 1s. To Havre, Cotton, 3-8c. *a* ½c.; Ashes, $8 per ton; Flour, 45c.; provisions, 65c. To San Francisco, 22½ *a* 25c. per foot, and $9 to $10 per ton.

June 27.—The never-improving dullness in trade continues; grain to Liverpool is down to 2½d. per bushel. The fact is that so many of packets require ballast, and must have it on their return voyages to this port, grain cannot command a fair price. The same is true with regard to iron freights from the other side. There is no change worthy of note in rates.

TEAK FREIGHTING.—Several American ships have lately been chartered to load deal at Maulmain. American vessels have heretofore been employed in this trade, but not to any considerable extent. The ship Mausoleum, Capt. French, of 447 tons, went to Maulmain to dock and repair, on account of the facilities there and the cheapness of labor. She loaded 540 loads of 50 cubic feet, and had no stowage or plank, both of which are now given. The Clarendon, of 550 tons, took 700 loads. Capt. French says the timber weighs only about 2,000 pounds to the ton, or load, is lighter than oak, and is similar to hard pine. It is easily worked, and an easy cargo to carry and load. The timber is generally 23 to 50 feet long, and an average of 12 by 16 inches square. He wedged his cargo close, and drew with this cargo 17 feet. His ship loads usually to 18 feet. On his passage from Singapore he beat up in sixteen days with a head wind; made Archeen head point of Sumatra, and coasted along shore in and out of the islands, a bold shore—the second time he passed through the straits. He had a cargo at £4 10s per load; now £5 5s is paid. Under a charter at this rate, he is about to proceed to Maulmain for the third time.

Rice freight charters from Akyab, Rangoon and maulmain, at £4 5s, are now to be had in New-York and Boston, which is also a desirable business for our ships. Charters from Liverpool and London to Calcutta and back are offered at good rates.

SEAMEN AND WAGES.

June 10th.—The wages and advances of seamen show a further decline since the closing of May. We quote:

	Wages.	Advance.
To Liverpool	per month, $20	$20
London	20	20
Havre	18	18
N. of Europe	18	18
Mediterranean & South America	15 & 16	15 & 16
West Indies	16	16
East Indies and California	15	30
Coasting	18	9 & 10

June 24th.—Sailors have continued in fair supply, and submitted to a still further decrease of wages. We quote again:

	Wages.	Advance.
To Liverpool	per month, $17	$17
London	17	17
Havre	17	17
North of Europe	16	16
Mediterranean and South America	16	16
West Indies	18	18
East Indies and California	15	30
Coasting	18	9

To Liverpool, via British America, $18 per month and $8 advance is paid.

The system of advance wages is about to fall into discontinuance. The shipowners of New-York, Boston, Philadelphia and Baltimore have held meetings urging the necessity of abrogating the system of paying advance wages to seamen after the first of July. In each of the above-mentioned cities it was unanimously voted that hereafter, ship-owners will furnish one suit of warm clothing and give a bounty of 10 per cent on the earned wages of those of the crew who perform the voyage and in the case of the loss of the ship on an outward voyage, the seamen to be paid the wages earned to the time of such loss, and in no case less than one month on foreign, and for two weeks on coastwise voyages. The Boston merchants and shipowners recommend the passage of a law to exempt seamen from arrest for debt during the voyage for which they have agreed to ship and signed the articles; this exemption from arrest to commence forty-eight hours prior to the time for sailing on the voyage specified in the shipping articles that shall have been signed by them. They also invite the cooperation of ship owners and agents in all the neighboring seaboard States and the British Provinces. In Baltimore the arrangements have not all been perfected. Another meeting is to be held, when arrangements will be made to cooperate with the New-York merchants, and those of the other large seaports.

IMPROVEMENT OF SEAMEN.

The ship-masters and agents of New-York held a meeting July 1st, at room No. 13, Insurance Buildings. Mr. C. H. Marshall was called to the Chair, and Mr. S. W. Phillips was elected Secretary.

Mr. Perrit, on the part of the committee of the Chamber of Commerce, reported that a correspondence had been held with the Board of Trade of Boston, Philadelphia, Baltimore and New-Orleans, and that in all these places a movement was in progress, aiming at the abolishment of advanced wages, and that resolutions to this effect had been adopted in Boston and Philadelphia, and would probably pass in other cities. The following resolutions were adopted unanimously:

Resolved, That we regard the change in the mode of shipping crews, to be adopted on the first of July, as constituting a new era in the history of seamen, highly favorable to their interests, and through their expected improvement, favorable to the interests of shipowners.

Resolved, As the opinion of this meeting, that it is desirable to increase largely the number of active American seamen, and that this can only be accomplished by rendering the service comfortable and respectable, so that young men of character and enterprise may find motives to choose the seafaring life as a profession.

Resolved, That in order to remove hindrances to entering the service, it is indispensable that all brutal and violent treatment in the government of men, which has in many cases been exhibited, should be abandoned, and that commanders and officers convicted of using such violence, should be considered as thereby disqualified for all further service.

Resolved, That it be recommended to ship owners in selecting commanders and officers of ships, to look carefully to the moral character of those who offer themselves, as well as to their several qualifications, and that, by instructions to their commanders, by personal attention to the subject, and by every practical influence, they endeavor to secure the good treatment of crews of ships sailing under their orders.

Resolved, That, to meet the cases which may arise, in the absence of advance wages, of men who may be without means to pay their board, it be recommended to ship-owners to arrange that the crews may live on shipboard after signing the shipping articles.

Resolved, That shipping articles presented by the Committee, be approved and adopted.

The meeting then adjourned.

SALES AND PRICES OF SHIPS.

The following sales will indicate the depressed state of the market.

By auction two-thirds of the barque Revolution, 458 tons, built in Maryland in 1855, sold at $10,000 cash.

Barque Union, 8 years old, 296 tons, Eastern built, has been sold for a whaler at $9,000.

Ship Antelope, 507 tons, built at Medford, 4 years old, for the East India trade, at about $18,000.

Barque Architect, 400 tons, built at Rockland, Me., in 1855, for a New-London Whaler, $18,000, equal to cash.

Ship Adriatic, 750 tons, built in Bath, 5 years old, at Bordeaux to sail under French colors, on private terms.

Ship Atlas, sold for $15,500, not $45,000. She was purchased by Capt. H. A. Brightman, of New-port, R. I., who will command her.

Brig Brookline, 147 tons, built at Eastport, Me., in 1844, sails, rigging, chains and anchors in good order, was sold at Boston, 24th, for $1005, cash.

Schr. C. C. Davis, 88 tons, 8 years old, was sold at auction, 9th inst., at Gloucester, for $3 410.

Barque Corinthian, 253 tons, built at Harpswell, Me., in 1851, well found in sails and rigging, has been purchased for $6,000, cash.

Brig WATER WITCH, 145 tons, 10 years old, built in Newbury, Mass., has been sold for $4,100 cash.

The yacht STELLA, 60 tons, built at Mystic in 1855, and owned by C. W. Cameron, of New-York, was sold at auction at New-London, by Sheriff Payne, on Wednesday last, for $2,150. Messrs. Sampson & Tappan, of Boston, were the purchasers.

Bark E. A. Rawlins, built at Norfolk, Va., in 1854, 273 tons, was sold yesterday for $13,000.

Bark Clara B. Williams, 300 tons, 1½ years old, built in Baltimore, at $16,000.

Schr. Nahum Stetson 2 years old, 174 tons built in New-York, $9,000 cash.

Barque COSSACK, 256 tons, with all her whaling gear, Chronometer, &c., as she was discharged from her last voyage, was sold at auction 12th inst, at New-Bedford for $3,000.

Ship CATO, of Boston, 470 tons, 17 years old, built at Medford, coppered one year since, and a large carrier, has been sold for $9,000 equal to cash.

A new ship, 1300 tons register, by auction at Portsmouth, N. H., for $65,000.

Schr. Lane, 163 tons, 3 ye rs old, built at Rockland for $5,000.

Ship Isaac Newton, of Boston, 600 tons for $16,000; and Brig Enoch Benner, of Boston, 150 tons, at $5,000, equal to cash.

There are three of four new ships above one thousand tons burthen now upon the Boston market without purchasers, and we hear of one of 868 tons that has been advertised for 10 months, and would be sold for $47 per ton, new and complete.

LAUNCHES.

At Mystic, Ct., By G. Greenman, a ship of 1,500 tons, and a sloop of 100 tons.

At Damariscotta, a barque of 350 tons, name not reported.

At East Boston, a barque of 700 tons, called the LAUGHING-WATER.

At East Machias, a schr. of 138 tons, called the CARROLL.

At Baltimore, barque CHEVALLIE, of 500 tons burthen.

At Belfast, schr. NATHAN CLIFFORD, 135 tons.

At Bath, a ship of 1190 tons, not yet named.

At Fairhaven, by R. Fish, a clipper bark of 406 tons.

At Green Point, L. I., by Webb & Bell, the bark Magi, 700 tons.

At East Boston, by Paul Curtis, ship Fortuna, tons.

At Green Point, by Samuel Sneeden, steamboat Bridgeport, 245 ft. long, and 34 ft. beam.

At Belfast, Me., a bark of about 400 tons, the Collin Mc. Rae.

At Salisbury Point, by Burnham & Fowler, a schr. of 90 tons.

At Newburyport, by Joseph Coffin, a bark of 430 tons.

A ferry boat for the Jersey City ferry, from the yard of Burtis, at Red Hook Point, Brooklyn The boat is named John C. Darcy, she is 185 ft. long, 32½ feet in breadth, and has 12½ feet depth of hold. Her cost will be about $45,000.

DISASTERS AT SEA.

BRIGS.

St. Croix, of Arichat, was seen April 17th, with loss of mainmast.

Caroline, Nova Scotia for Boston, went ashore at Cohasset, April 20th.

Ida, Melbourne for East Indies, totally lost at Port Willunga, Jan. 15th.

R. B. Porter, (Br.) at Portland, from Liverpool, lost some spars, bulwarks, &c.

Fidelia, Porto Rico, for Georgetown, S. C., grounded January 15th, on St. George's Island Potomac River.

Plantagenet, (Br.) Cardiff for Portland, went ashore in York Harbor.

Rolling Wave at New-York, from Menitas, lost deck load of sugar.

John Alfred, of Pittston, was abandoned, Capt. and crew taken to England.

Lady of the Lake, Jacksonville for Bath, put into Charleston leaky.

Lillian, Carribean Sea for Baltimore, was spoken off Cape Hatteras, dismasted.

Wallcott, for Humboldt, returned to San Francisco leaky.
Correo, for Cuidad Bolivar, put back to N. Y., lost spars, sails, &c.
Orison Adams, at Havana from Portland, lost part of deckload and boat.
Fannie at N. Y, from Trinidad, lost part of deck load, sails, bulwarks, &c.
R. B. Porter, (Br.) at Portland, From Liverpool, lost bulwarks and some spars.
Isabella Reed, for N. Y., put into Bermuda, leaky, lost deck-load.
Wave, for St. Domingo, was lost previous to April 28th, in Crooked Island Passage.

SCHOONERS.

Unknown. (large) West Indies for New-York, ashore near the Hammock Green Run Inlet.
Trident at St. Johns, N. B., full of water, had been ashore on Mount Desert, Me.
Julia Ann Staples at Havana, from Bath, lost most of deck-load.
Boston, at Baltimore, from Georgetown, S. C., lost part of deck-load April 12th.
A. Tyrrell. at Baltimore from Portland, lost deck-load.
W. W. Fulton, Philadelphia for Nevis, totally lost near Anguilla.
Georgiana, for Baltimore, was seen ashore on Bahamas, is now a total wreck.
J. A. Westervelt, (Pilot boat) was run into in New-York Bay, lost bowsprit.
Ebna Jones, (Pilot boat) at Key West, lost boats, sprung mainmast, &c.
Lion, Gardiner, for Tiverton, R. I., went ashore in Lovejoy's Narrows, May 4th.
Frederick Reed, at Baltimore, from Mayaguez. lost masts and deck load.
Alquizar, for Savannah, in collision, put into Norfolk in distress.
Lookhere, Cardenas, for Philadelphia, abandoned April 20, afterwards sank.
James F. Bertine, Boston for Philadelphia, abandoned leaky.
Reindeer, Newburn for N. Y., abandoned April 19th.
Alhambra, Georgetown, S. C., grounded on the rocks at entrance of Mattapoeset Harbor.
Gen. Grant, (Br.) for Baltimore, put into Bermuda, lost bowsprit, foremast, &c.
M. J. Prettyman, N. Y., for Satil a river, Geo., abandoned leaky, April 21.
Alexander, from Rondout, got ashore on Coninicut Point, about May 15th.
Leah, Philadelphia, got ashore May 7th, on Windmill Reef, Stonington Harbor.
Alfred, of Fairhaven, got ashore on E. N. E. end of Hind's Island.
Lion, Gardiner for Tiverton, R. I., went ashore in Lovejoy's Narrows, May 4.

NOTICES TO MARINERS.

We beg to invite particular attention to the following letter from a pilot at Shanghai.

"Shanghai, April 4th, 1857.

"Messrs. Editors:—Gentlemen, enclosed you will please find a Notice to Mariners, by G. L. Carr, Master of H. M. ship *Pique*. The buoys have been laid down according to Lieut. Preble's directions, and will, I have no doubt, be very serviceable. There is one mistake or misprint in the position of No. 2 buoy, which you will find marked on the notice.

I beg to make a few remarks, if you think it worth notice. Young Salt, Mr. Swain and Lieut. Preble, thinks no vessel ought to enter the river, without first seeing Gutzlaff; then keeping near the South Bank, being much the safest. But Captain Collinson, in his directions drawn up at the time he surveyed the river, recommends a deep ship to run for the Am-

herst Rocks; as, in the N. E. monsoons, it would give them much the most weatherly position, as well as the truest tides, and now there is a beacon ship where he advises boats to be stationed on the S. E. spit of Tung, shew sands, and is easily seen six or seven miles. That if a vessel follows Collinson's directions from Amherst rocks, she will find very little difficulty in making out the beacon ship and midway buoy, after making twelve or fourteen miles west by south. When the B. ship bears N. W., run direct for her, passing on S. W. side of her; when she bears S. E. to E. S. E., two or three miles, anchor, unless a certified pilot is on board, when the Jack will soon find one. Lieut. Preble thinks there may soon be a light-house on Gutslaff, Ja., which would no doubt be good; but if a light-house should be built on the Tung-Shaw Banks, just inside No. 2 buoy, it would be much the best position for one, as it would be a good leading mark, both in and out of the river, and now the Bank has grown so much, there would be no difficulty of raising a foundation, as it never covers at any time of tide, and it would be in such a prominent place, a vessel could run direct for it, until within half a mile. It would also keep a vessel clear of the Tung-Shaw Banks, and prevent them entering the north entrance, by mistake; also, be a guide if the beacon ship gets removed at any time. In fact for various reasons it would be the best position, and near the north side is the deepest water. When on the south side, she would often be in her own draft of water.

The beacon vessel—not light vessel, as she shows but a very poor light, not visible over one or two miles, and then only head on, nor has she as much water at low water as stated. By looking through her log, I find she has only 3 3-4 fathoms one-third of the time, and four fathoms half the time, which would make some difference to a deep ship; for thinking to find eighteen and twenty feet, only have fifteen to seventeen, at low water, would be a great difference, and no doubt cause them to ground. If these remarks are of any service, the public are welcome to them.

I am, &c. J. W. Rickard, Pilot.

The following is the Notice referred to; we copy as printed. The error pointed out, will be found to relate to the bearings of the Buoys on the North Sand.

Office of Maritime Customs,
Shanghae, 23d. March, 1857.

Notice is hereby given, that in pursuance of arrangements made by the Chinese Authorities for the improvement of the navigation of the Yangtze Keang, eight iron nun buoys have been moored between Gutzlaff Island and Woosung. These have been laid down by Mr. George L. Carr, Master, R. N., in the following positions :—

In the Fairway, at the entrance of the river, one painted with horizontal black and white stripes.

On the South Sand, three painted black, and numbered 1, 3, 5.
On the North Sand, three painted red, and numbered 2, 4, 6.
On the North Spit, off the entrance of Woosung River, one painted red, and numbered 8.
The numbers on the buoys commence from seaward.

Fairway Buoy is painted with horizontal black and white stripes, with staff and vane, and lies in 4¾ fathoms, and from it Gutzlaff bears S. 11° 15' E. 18 miles; Light Ship N. 56° W. 7½ miles.

In entering the river from seaward, the red buoys should be left on the Starboard hand; the black buoys on the port hand.

Buoys on the South Sand.—No. 1.—Painted black, with staff and vane, lies in 18 feet, and from it the Tower bears N. 56° W.; Light Ship E. 3 1-3 miles; buoy No. 3, N. 50° 37' W. 8 1-3 miles; buoy No. 2 N. 11° 15' W. 3¾ miles.

No. 3.—Painted black, with staff and vane, lies in 18 feet on the edge of the bank, extending to the S.E. of the Tower, and from it the Tower bears N. 72° W.; Light Ship S. 59° E; buoy No. 4, N. 14° W. 2 3-4 miles.

No 5.—Painted black, with staff and vane, lies in 20 feet, and from it Block House Island bears N. 18° E.; Tower S. 39° E.; buoy No. 6 N. 45° E. 1 3-4 miles. S.S.W. of this buoy, about a ship's length, the depth of water is 2 fathoms. In standing towards this buoy, tack on the first shoal cast, for the bank is steep; close outside the buoy, the depth is five fathoms.

Buoys on the North Sand.—No. 2.—Painted red, with staff and vane, lies in 19 feet, and from it the light-ship bears S. 48° W.* 5½ miles; Tower N. 73° W.; buoy No. 1, S. 11° 15' E. 3 3-4 miles. The nearest point of the North Sand is dry at low water, bears N. 5° W. about 200 yards, and shoals suddenly inside the buoy.

No. 4.—Painted red, with staff and vane, lies in 20 feet, and from it the Tower bears S. 63° W. 3½ miles; Block House N. 39° W.; buoy No. 3 S. 14 ° E. 2 3-4 miles.

No. 6.—Painted red, with staff and vane, lies in 19 feet, and from it Block House bears N. 2 miles; Tower S. 16° E.; buoy No. 5 S. 45° W. 1 3-4 miles.

No. 8.—Painted red, with Staff and Vane, lies in 17 feet, and from it Paoushan Point bears N. 65° W.; leading marks into Woosung, S. 55° W.; Mud Fort, S. 12° W.

The depth of water given is reduced to low water, Spring Tides.

The bearings are all magnetic.

Light-Ship—The light-ship is moored in 4½ fathoms, at low water, and bears N. by W. 3 4 W. from Gutzlaff Island, from which she is distant 23 miles, and one mile from the southern spit of the north bank.

The Tower.—Erected on the south shore of the Yangtsze Keang, at Kew T'oan, lat., 31° 15' 30" N, long. 121° 45' E., is a plain structure of brick, painted red and white. Its height is 67 feet, and it bears from the light-ship N. 63° W., distance 16 miles.

The trees upon Block House Island bear from it N. 15° W., distance 8 miles.

GEO. L. CARR, Master, R. N.,
H. M. S. "Pique."

By order,
WM. LENT, Secretary.

* Should read S. 48° E.

RUSSIAN CONSULATE GENERAL IN THE UNITED STATES,
NEW-YORK, May 22, 1857.

ALTERATIONS IN THE LIGHTS IN THE BALTIC SEA.—Navigators of the Baltic Sea are hereby notified:

1. That in order to enable vessels to tack with more safety during the night time in the road to Reval, the light of one of the two light-houses at Reval, namely, the southerly light-house of Katherinenthal, will be, from the 13th of July, 1857, so organized that its permanent light will be visible at the entrance in the road on the east side, to the west of the meridian of the Bank of Deweley, in order to assist those who navigate on the west side, between Nargen and Sourop, to avoid the Southern reefs.

The light of said light-house will be seen easterly as far as NE 7½°, and westerly as far as N. W. 56½°

No alterations are made in the regulation of said light-house, except as above stated.

Said light-house will be, as formerly, lighted every year at the same time as the westerly light-house of Katherinenthal.

2. Two of the light-houses in the Gulf of Finland, to-wit:—the Seskar light-house, on the extremity NW of the island of that name, and the inferior light-house of Hockland will, by way of experiment, remain constantly lighted during the summer of 1857, even from the 16-28 May to the 1-13 day of July, during which time the other light-houses are not lighted, according to regulation, on account of the shortness of the nights.

In order to indicate dangerous places near the Fort Paul 1st, and the Fort Constantin, there will be in the road of Cronstadt, from the opening of navigation for the year 857, besides the safety buoys now in said road, other buoys at a distance of two cable lengths (that is to say 200 sagenas) from one to another, and particularly in the northerly part of said road, there will be red buoys; and on the southerly part, blue busys; and on the west of the fort Paul st, there will be sea-marks or beacons.

All these signals will be renewed every year.

No vessel, even of very light draft, can, without running into certain and positive danger, go beyond the line of the buoys, sea-marks, or beacons above mentioned.

NOTTBERT.

The Lempa Shoal, on which two vessess have recently struck, and which is not laid down on any chart, is in lat. 13 deg. 02 min. 20 sec. North, lon, 88, deg 10 min West. It extends N. E. and S. W. about three miles, and two miles from East to West.

The Volcano of San Mignel bearing NNE by compasses over the centre of the Shoal. The extreme southern point of the Shoal is at least ten miles off shore.

This information was furnished by David Hoadley, Esq., President of the Panama RR. Co., from observations made by Captain Dow, of steamer Panama. G. W BLUNT.

NEW LIGHT-HOUSES.—The following notices of the erection of new light-houses for the Strait of the Dardanelles have been received in a communication, dated May 23, from E. A. Offley, the U. S. Consul at Smyrna:

Advertisement to navigators—five new light-houses in the Strait of the Dardanelles, 15th March, 1857.

Light-house of Nagara Kalessi—revolving red light, the eclipses of which follow each other every 15 seconds. On the tower of the castle of Nagara, (Asiatic side); lat. 40° 11′ 32″ north, long. 24° 04′ 18″ east of the meridian of Paris. Height 12 metres, (or 39 feet, 4 inches, and 44.100 Eng.); seen within ten miles. The eclipses are not total till at a distance of over 5 miles.

Two green lights at Bovali Kalessi, perpendicularly placed over each other on the WSW angle of Bovali battery, (European side) at 1¼ mile opposite, and to the north 88° west of Nagara Castle; lat 40° 12′ 30″ N, long 24° 3′ 24″ E; height of the upper light, 14 metres, (or 45 feet, 11 18.100 inches English); seen within 4 miles; height of the lower light 8 metres (26 feet, 2 96.100 inches English; seen within 4 miles.

Two Green Lights of Namazieh, perpendicularly placed over each other on Namazieh battery (European side) at 3-4 of a mile opposite, and to the west 8° south of "Tchanak Kalessi. (Dardanelles in Asia.) Lat 40° 8′ 36″ north; long 24° 3′ 15″ east; height of the upper light 11 metres,) 36 ft 1 7-100 inches Eng); seen within 4 miles; height of the lower light 6 metres, 19 ft, 8 22-100 inches Eng.) Seen within 4 miles.

Two green lights of Galata, perpendicularly placed over each other on Galata Point, (European side.) 2½ miles opposite, and to the north of Fishermen's Point. Lat 40° 19′ 4″ N; long. 10° 14′ 24″ E. Height of the upper light 19 metres, (62 ft, 4 3-100 in Eng); seen within 4 miles. Height of the lower light, 13 metres, (42 ft, 7 81-100 inches Eng); seen within 4 miles.

NOTE.—This light is placed near the mouth of a stream, the delta of which has run out about 400 metres beyond the point marked out on the charts.

Two red lights of Tchardakh, perpendicularly placed over each other on Tchardakh Point, (Asiatic side) at 2 miles 2-3 to the north, 15° E of Lampsaki. Lat 40° 23′ N—long 24° 21′ E. Height of the upper light, 12 metres, (59 ft. 66-100 inches Eng)—seen within 4 miles; height of the lower light 12 metres, (39ft 4 44-100 in Eng)—seen within 4 miles.

NOTE.—The shade of the green lights is very pale.

PROPOSALS FOR SCREW PROPELLER SLOOP-OF-WAR.

NAVY DEPARTMENT,
Bureau of Construction, &c., June 27, 1857.

The bureau will receive Sealed Proposals, Specifications and Plans, until the 24th day of August next, endorsed, "for the Construction of a Steam Propeller Sloop-of-War," authorized by the act of Congress, approved 3d March, 1857.

The proposals must be for the hull, spars and spare spars, rigging and blocks, sails and spare sails, awnings, &c., boats, anchors and cables, tanks, casks, furniture and cooking utensils, the steam machinery and spare work, with all the equipments and outfits of a ship-of-war, to be complete and ready in all resepcts to receive her officers and men, provisions, stores, and armament.

The armament, stores, and provisions will be furnished by the government.

The specifications must fully describe the materials to be used, the method and sizes of fastenings, the detail of sizes and arrangement of the machinery, the various fixtures of equipment and outfit, the cabin for captain, wardroom for twelve officers, steerage for fourteen officers, apartments for four forward officers, the store, sail, bread, clothing, issuing-rooms, &c., sick bay, magazines, shell-rooms, holds, chain and other lockers. Also, the dimensions of the spars, boats, and all the other objects included in the proposal.

Upon application to the commandant of any Navy Yard, the bidder can see the list of stores and provisions with which the government will furnish the ship, and for which, also, the contractor in his plans must provide capacity and convenient storage.

The plans must be working drawings, from which the ship can be built, showing the inboard arrangements, the allotments of space for accommodations for store-rooms, for the storage of the various objects of equipment, outfits, provisions, and stores, the arrangement of the machinery, and the disposition of the coal. There must also be a plan of the sails, showing the courses, top-sails, top-gallant sails, jib, and spanker.

The plans will be accompanied by a model, which with the drawings of the hull, must be on a scale of one-quarter of an inch to a foot.

The ship to be pierced for chase, stern, and broadside ports—the latter not less than twelve in number on each side, and to be fourteen feet two inches from centre to centre. The port sill to be twenty inches above the deck, the ports forty-four inches fore and aft, and thirty-eight inches in depth.

The weight of armament to be provided for in the displacement, will be 160 tons of 2,240 pounds.

The total complement of officers and men will be two hundred and sixty-five persons, and the ship must stow provisions for one hundred and twenty days, and water for ninety days, with a condenser for distilling fresh water. Fuel to be carried for thirteen days full steaming, and the vessel to make under steam alone at her deep-load draught of water, ten knots in a smooth sea. The deep-load draught of water, when armed and fully equipped with men, provisions, and stores of all kind, and ready for sea, not to exceed sixteen feet, and the lower port sill to be eight feet above the load line.

The propeller to be fitted to hoist up, and the boilers to have a telescope chimney, so that the ship may not be impaired as a cruiser under sail, for which she is intended.

The bidder will state the time considered necessary to complete the ship for sea, together with the price, fully equipped as before named.

The object of the department in inviting proposals, is to obtain the very best ship-of-war that the mercantile marine can produce, and proposals will be received from shipbuilders only.

The proposals, specifications, and drawings which conform to the conditions now prescribed, and combine the greatest number of advantages, will be selected, and the price must receive the approval of the department before a contract will be made. The reputation of bidders as successful constructors, will have due weight. The specifications, drawings, and models of parties not obtaining the contract, can be withdrawn by them.

REMARKS.

The above is an earnest of the determination of the Hon. Secretary of the Navy to enlist the skill of our Shipbuilders and Engineers in the production of ships-of-war. It will be observed the draft of water approximates the mark recommended in this journal, but it is to be hoped a less draft than even sixteen feet will be adopted for the new sloops. The speed of "ten knots in smooth water," is rather moderate for a *minimum* rate; not less than twelve should be seriously entertained. We trust the Bureau of Construction will consider it no objection to the acceptance of plans—otherwise good—that a higher rate of velocity than ten knots is proposed.

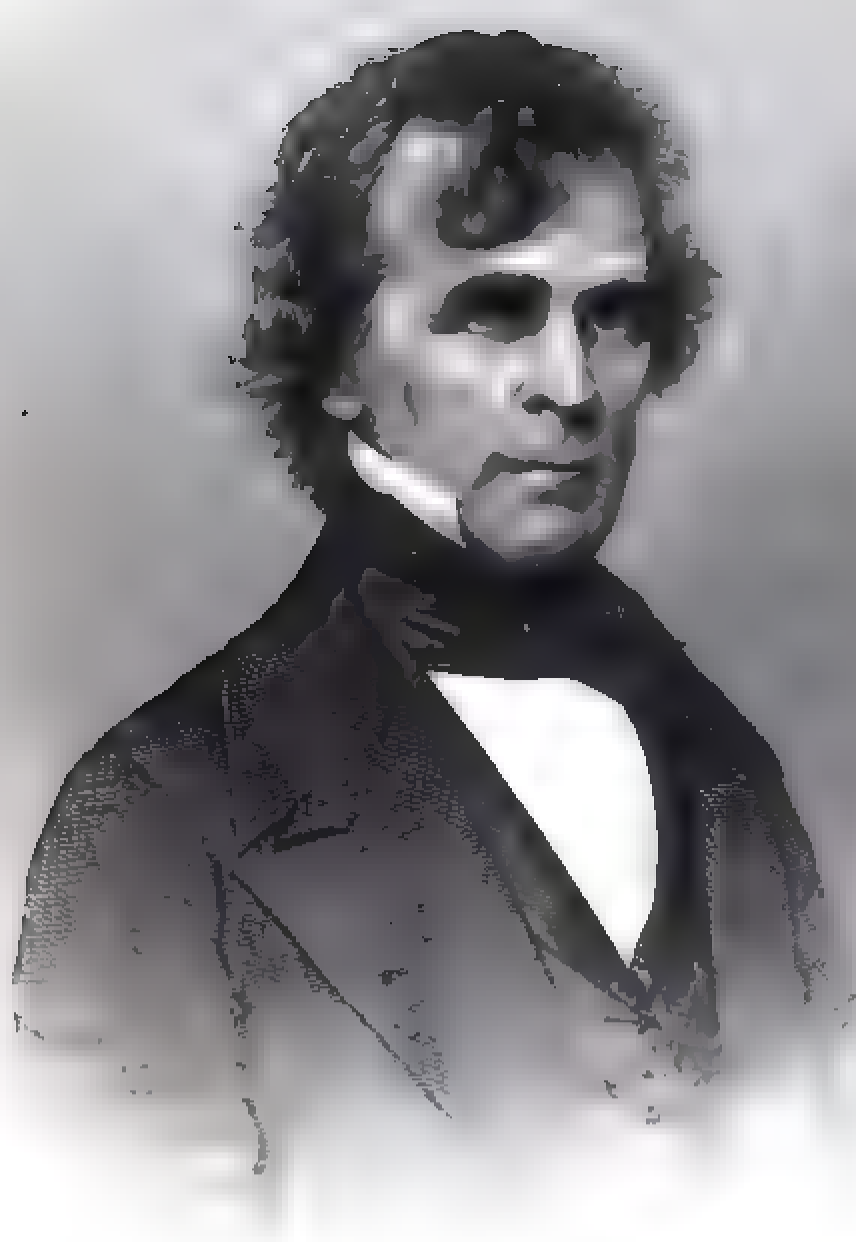
This advertisement may be viewed as a challenge from *Naval* to *Marine* Constructors. The latter should not forget that the decision upon their plans, in conformity with the time-honored practice in the Navy, is to be rendered by the former.

CARR'S PATENT STEERING APPARATUS.

This is an English patent; it is applied to the packet ship *Emerald*, now in this port, loading for Liverpool in Thayer & Warren's line. Abaft the rudder-head, there is a horizontal iron wheel three feet nine inches in diameter, and on the rim of it there is a socket which encircles the tiller, which is also of iron and round. The edge or face of the wheel has two grooves in it, and in these grooves there are two chains, which are brought through fairleaders to the barrel of the vertical wheel, by which the ship is steered, and which is the same as any other wheel in general use. It will be seen by this application of power, that it embraces the lever and the pully purchase in a very simple but efficient form. One revolution of the vertical wheel puts the helm hard to port or starboard; but this is not all, for the power increases at every inch after it passes the centre, and this power can be relaxed in a second, should the ship require the helm to be eased in pitching. On each side there is a break to the horizontal wheel, so that the helmsman, when the ship gripes or is likely to fly in the wind, can hold every inch he has hove up, by simply pressing his foot upon the break. Again, should the chain give way, the tiller being always shipped, having shackels in its end, can have relieving tackles applied to it in an instant. In power, this apparatus is said to be superior to any of those upon the screw or cogwheel principle, is not so exposed to accident, is simpler in its operation, and not liable to twist the rudder-head—one of the great objections to the cogwheel apparatus. It is extensively applied in England, and we believe will soon become popular here when its merits are known. Capt. Cook, of the *Emerald*, has tested it in his own ship, and speaks of it in the highest terms.

John R. Pratt, 67 South-street, is the agent in this country.

How to Behave: A Pocket Manual of Republican Etiquette and Guide to Correct Personal Habits. Embracing an exposition of the principles of good manners; useful hints on the care of the person, eating, drinking, exercise, habits, dress, self-culture, and behavior at home; the etiquette of salutions, introductions, receptions, visits, dinners, evening parties, conversation, letters, presents, weddings, funerals, the street, the church, places of amusement, travelling, etc., with illustrative anecdotes, a chapter on love and courtship, and rules of order for debating societies. Price, post-paid, 80c.—muslin, 50c. New York: Fowler & Wells, 308 Broadway.



I. Toucey.

THE

U. S. Nautical Magazine,

AND

NAVAL JOURNAL.

VOL. VI.] AUGUST, 1857. [No. 5.

THE HON. ISAAC TOUCEY.

SECRETARY OF THE NAVY.

THIS distinguished Statesman was born in Newtown, Fairfield County, Connecticut, and is now about fifty-eight years old. He was distinguished early in life for vigorous habits, both of thought and action, winning the confidence of all who came within the orbit of his acquaintance, and securing the esteem of a wide circle of friends.

He received a private, but very thorough English and classical education, and, unlike most men, while engrossed in his profession, or absorbed in the exciting political movements of the day, he has maintained his familiarity with the best classical authors, in their own language, down to the present time.

Having chosen the profession of law, he became a student under the patronage of Judge Chapman, of the Supreme Court of his native State, and in 1818 was admitted to the bar, when he removed to Hartford, commenced the practice of his profession, and very soon acquired the reputation of a sound lawyer. His forcible illustrations gave tone to his keen perceptive qualities, and he soon secured a large and lucrative practice. Mr. Toucey pursued the practice of his profession with that constitutional steadiness, and with that peculiar perseverance for which he has throughout life been distinguished, until called to the discharge of political and public duties by the unsolicited suffrages of his fellow citizens.

Here his course has been marked by unvarying consistency, by that steadiness of principle and stern regard for truth and justice which were ever conspicuous in his professional character.

Having been an ardent admirer and a strict adherent to the doctrine of Jefferson, he soon became a leader of the Democratic party in his district,

and was elected to a seat in the State Legislature, and had now fairly made his *debut* in public life. His manly and consistent course gave him new adherents, and he was re-elected both to the House and Senate several times, each time acquiring fresh popularity, and a more enduring hold upon the confidence of his party at each successive term of service. In 1835, he was elected to membership in the House of Representatives of the 24th Congress, and took his seat at the commencement of the session. Having served out his probation, he was re-elected and was found at his post in the 25th Congress, and served to the end of his term, which closed on the 3d of March, 1839. During his term of service, such was his faithful adherence to the principles and measures of the Democratic faith, that an index was furnished to a career of future usefulness, and an exalted position secured in the confidence of his friends. In the year 1846, he was nominated for Governor by the Democratic party of Connecticut to which high office he was elected. It was in this position that his fine administrative talents first obtained scope for developement. He passed through his term of service with no cloud to bedim his future prospects, he was appointed by President Polk in 1848 to the important position of Attorney General of the United States, which had been made vacant by the resignation of Hon. Nathan Clifford, who was sent on a special mission to Mexico. Mr. Toucey was brought into immediate contact and close intimacy with President Polk's cabinet, of which Mr. Buchanan was a member, filling the office of Secretary of State. While in this connection a bond of esteem was formed which ripened into mutual friendship between the present Chief Magistrate and the first law officer which has lost none of its vitality by the progress of time. At the close of President Polk's administration they retired from public life, the one to Wheatland, the other to the stirring political scenes of his native State, in which he again became a prominent actor.

In the year 1852, Gov. Toucey was elected by the Legislature of Connecticut a Senator of the United States. During his term of service in the Senate, an opportunity was afforded him of showing to the world his firm and unflinching adherence to the National Democracy, during the great struggles in that august body. In this conflict Senator Toucey seemed as the lone Democratic Star of the East. The opposition failed to either crush or intimidate him. He closed his Senatorial career on the 3d of March last, with a name and reputation which the nation delights to honor. The selection of Gov. Toucey, by President Buchanan, to fill the place of Secretary of the Navy, which, above all others in the cabinet, is the most arduous and responsible, carries with it not only an endorsement of his past career, but a certain knowledge of his superior qualification for the office, determined by a Statesman who knows his worth and has measured

his capacity. We have the satisfactory assurance to anticipate that in the Hon. Isaac Toucey the Navy will find one who has the keen perception to discover the difference and make the proper distinction between the responsibilities of his own position and that of his Bureaus. We have the best guarantees, in the antecedent course of the Hon. Secretary, that he will think for himself, and whatever aid he may receive from his subordinates, he will look beneath the surface, and endeavor to appreciate motives as well as words and ideas. We may safely anticipate an improvement upon the past in naval matters.

Mr. Toucey entered upon the administration of the Navy Department at a very difficult and critical period. Without discussing the merits of the proceedings of the retiring Board, under the Act of the 33d Congress, it will be admitted by all that their labors, however honest and well-meant, produced great confusion and, in certain quarters, dissatisfaction, especially among the friends of the officers affected by the action of the Board.

So strong was the continued pressure brought to bear upon the 34th Congress, that another Act was passed providing for a revision of the proceedings of the first Board by Courts of Inquiry. The difficulties attending the execution of this law, peculiar in its detail and provisions—the many delicate questions necessarily involved and to be decided—the severe and constant additional labors required met Mr. Toucey at the threshhold, on entering upon the discharge of the duties of his Department.

We feel confident, however, of a successful result. The great experience of the Secretary in legal proceedings—his well-known caution and deliberation in coming to conclusions, affecting, as they may, both the private and official character of a fellow-citizen—his strong sense of justice, and his firm adherence to his convictions of right, we doubt not will give general satisfaction and restore order and harmony to an important arm of the public service, in which, it must be admitted, too much confusion and dissension have of late prevailed.

In the *personnel*, Mr. Toucey will deal with the intelligent men with whom he will be brought in contact, in a spirit of sincerity and justice. The officers of the Navy, who are a class of men peculiarly sensitive to fair and liberal treatment, will find that their claims are considered in a straight-forward and equitable manner, in their perils and privations, scattered as they are from the tropics to the Arctic circle, which deprives them of the advantages of concentrated action in enforcing their just demands. They will also learn that the present head of the Department will hold every individual strictly responsible for all official acts, whether of commission or omission, no matter how elevated by date of commission, or how humble by appointment—whether the veteran Commodore, the Chief of a Bureau, the Chief Clerk, or the Messenger, all will be held sub-

servient to the law of responsibility. They will find Mr. Toucey firm but courteous, just but liberal. We may anticipate that their interests, which have suffered from laxity of discipline, connected as they are with the most important interests of the nation, will be superintended in a spirit advantageous alike to them and to the country which owes much to their devoted exertions and self-sacrifices.

Nor will the people have reason to fear that the material of the Navy will remain in the same dilapidated and inefficient condition which has characterized it for years past. Secretary Toucey not only possesses the zeal of his predecessor, but he has the firmness of disposition, the penetration of character, and the integrity of purpose to enable him to distinguish between the efficiency of the ships of war of our Navy, and the merchant marine of our country. No measure will be undertaken by the Hon. Secretary which has not the careful consideration of his well-balanced mind. In the struggle between the ship-builders of the government and those of the country, Mr. Toucey will not be an indifferent spectator. While the naval constructors regard it as their prerogative to build public vessels, being, as they suppose, especially qualified for this service, the private builders point to the war vessels of our navy, constructed by men from their own ranks, without a failure among them—both may confidently rely on that justice which the interests of the country demand.

LOWERING A SHIP IN DOCK.

An interesting experiment was recently performed upon a ship in dock in Messrs. Green's dockyard, Blackwall. The Torino, *an iron screw vessel,* employed on the line between Genoa and South America, got ashore near Rio de Janeiro, and sprang a leak. The owners brought her up the Thames in a very leaky condition, to be docked. The repairing required one month, and, as numerous applications had been made for the dock, it was desirable to get her out as soon as possible. The tides not being high enough to float her, it was determined to try the bold experiment of lowering her in the dock to suit the tides. She was accordingly suspended by shores, the blocks were removed from beneath her, and replaced by others three inches lower. The shores were then slacked out, and she was allowed to drop down upon the blocks. This operation was repeated twice, and then the block-caps were split out to let her down the remaining distance—altogether about one foot. At two o'clock in the morning two steam tugs laid hold of her and, after a short struggle, succeeded in getting her out safely.

MACAO.

THE spacious and beautiful bay of Canton contains several large and thickly populated islands. At the south-eastern extreme of one of these, on a small peninsula, stands the town of Macao, most favorably situated, and the first European establisement formed in that part of the world. It was founded by the Portuguese in 1579, and is connected with an historical event of considerable importance in Chinese history.

About the middle of the sixteenth century, the settlements on the coast of China were ravaged by a pirate named Van-Foo, celebrated in the annals of the East, who threatened even the foundation of the Imperial government. Lia-Sing, the then reigning prince of the Mantchou dynasty, (the Tai-Tsing or 22d,) finding his navy destroyed and himself powerless against the attacks of the formidable Van-Foo, begged the assistance of the Portuguese, the only nation which at that time had ships of war in those parts. Dom Alvarez de Lerida, the commander of the Portuguese forces, met the request of the Emperor by hastening to his assistance, and defeating the pirate Van-Foo, took him prisoner and sent him to Lisbon.

The Emperor Lia-Sing, in gratitude for this important service, immediately conceded to the Portuguese the Peninsula of Macao, along with the right of trade, and the privilege of establishing factories in three of the most important ports of the Celestial empire. At that early period these advantages were highly valued; the Portuguese being then the first maritime nation in the world, were gradually extending their possessions under the vigorous impulse of the celebrated Prince Henry, and the expeditions of Bartholomew Diaz, Vasco de Gama, Cabral, and especially the talented Albuquerque, had then rendered Portugal the mistress of the seas.

Albuquerque, after having secured for his country a power until then unknown in India, by extending the Portuguese dominion to Malabar, Ceylon, the Sunda Isles, the peninsula of Malacca, as well as the islands in the Persian Gulf, died at Goa, in 1515, in the zenith of his glory, just as he was preparing to return to Europe, but disgusted with the intrigues which had troubled him in the latter part of his career.

Conquests like these, by enriching the crown of Portugal, encouraged the desire for foreign enterprise, and the establishment at Macao soon became considerably enlarged. The Governor, supported by a strong garrison, and a formidable maritime force, commanded respect, and on several occasions severely chastised those who had ill-treated foreigners. Thus protected, and under treaties concluded with the crown of Portugal, the different maritime nations of Europe established their factories at Macao, and in 1675 the business transacted there produced 100,000,000

of francs, which was no mean sum for those days. The French factory was one of the most considerable, the importance of which may be estimated by the position it still occupies. One of the last agents of this establishment was the celebrated orientalist, De Guignes, who died in 1811, and whose memory is still cherished with respect.*

Besides their factories, several European powers, especially the French, had scientific establishments at Macao, devoted to the study of the Eastern languages; the students, acting as government interpreters of the Chinese language, remaining there several years. In 1778 the power of the Portuguese, who for nearly a century had monopolized the trade of China, Japan, Cochin-China, and the empire of Anan, began to decline: other nations, especially England, having entered into active competition with them, so that in the beginning of the eighteenth century they lost the high position which they had occupied. The establishment of Macao will always be theirs, but it is now the mere shadow of its former self, and it has even decreased since the formation of the English establishment at Hong Kong, resulting from the war of 1840.

Such is Macao in the present day of February, 1857, although of peculiar interest in an historical point of view. With the exception of the English embassy, removed to Hong Kong, all the European embassies continue there. It is the centre of foreign diplomacy, and the general rendezvous for the agents of the great trading companies.

The Portuguese flag graces the Governor's palace; but the present garrison is insufficient to command the Chinese population and its detestable ways; and hence the principal part of the ruling authority is in the hands of a mandarin. It is said that the Portuguese intend to remedy this state of affairs, and that the garrison is to be increased; the existing fortifications are about to be repaired, and the great wall, separating the Chinese territories from their possessions, is to be rebuilt. These intentions deserve our encouragement; their realization will not prove expensive, and will be very advantageous to all the foreign population.

The appearance of Macao, from the harbor, is most attractive. Splendid buildings are seen as a vast amphitheatre, amongst which is the Convent of Guia, the residence of the bishop, two convents, the Governor's palace, and the houses of resident foreigners. Since the insurrections in Canton, Macao has remained quiet. The Chinese population are restless, but quietness has been preserved by the presence of ships of war, anchored in the roadstead, and by the numerous guards which are continually landing.—*Moniteur.*

BREAKWATERS AND HARBORS ON THE LAKES.

From the Reports of J. D. Graham, *Major T. E., Brevet Lieut. Colonel, Superintending Engineer.*

MICHIGAN CITY BREAKWATER, INDIANA.

No work having been done on this breakwater during the past season, on account of the appropriation of 1852 being exhausted, I have to submit my report of last year, in relation to this improvement, as applicable at this time. It constituted a portion of Part II. of that annual report, which was left out in the printing of Senate, (Executive) Document No. 77, of the 34th Congress, 1st. Session.

It embraces estimates of cost, in full detail, and the statistics of the great extent of commerce interested in this work. Also views of its importance as a safe refuge for our armed ships in time of war. It is as follows, viz:

In regard to the position for this work, I beg leave to refer to the views which were expressed in full in my general report to the Bureau (No. 73) of the 29th of April, 1855.

It was recommended in that report that the original plan of the Board of Engineers should be adhered to, of placing the work in a depth of 25 feet of water, so as to have it to rest on a clay bottom at an average distance of one thousand (1,000) feet lakeward from the isometrical curve of twelve (12) feet depth.

Thus situated, the breakwater would, when completed, afford an easy access and refuge for vessels generally, during the prevalence of northerly and northeasterly storms, and the extent of roadstead would then be sufficient to accommodate the navigation of the great lakes, generally employed in commerce with the ports of Lake Michigan.

It was not until the 11th of August that the action of the Board upon this point was received at this office. It is hereto attached, marked H 8. The Board adhered to its modified or second plan, which required the breakwater to be placed in a depth of nineteen (19) feet of water, thus throwing it upon a sandy foundation.

It allowed the cribs to be constructed to a width of twenty-five feet, instead of twenty feet, which had previously been directed for this depth of water.

In pursuance of this decision the work was immediately pushed forward with all possible industry. The accompanying documents, marked from H 1 to H 23, contain information in detail connected with it.

The cribs were constructed in conformity with the drawings shown upon the accompanying sheet, marked G. No. 21, or case 3d of crib work,

except that the iron bolts were arranged as they are shown upon sheet G, No. 19. This was assented to upon the representations of Agent Bowers, that he found it difficult to drive bolts as long as 30 inches into the highly seasoned oak which he had to deal with.

On the 14th September the first crib was completed to a height of 2? feet from the bottom timbers and successfully sunk in position.—See the report of Agent Bowes, hereto attached, marked H 12. Immediately after this the usual autumnal gale commenced. Its action against this crib caused the sandy foundation to be washed away to the depth of four (4) feet, and the crib consequently settled an equal quantity, but without any essential difference of level, thus adding another proof of the importance of the open latticed bottoms enjoined by the Bureau and the Board of Engineers, for all wooden pier work. The falling of the stone through the open interstices, thus supplying the place of the sand as fast as it was washed away, ensured this result.

It would seem, then, that no economy in the cost of construction was ensured by the placing of the cribs in 19 feet, in lieu of 25 feet depth of water. The latter depth would have given us a clay bottom, not subject to any wash by the action of the lake waves.

Had the weather, on the subsiding of this gale, remained favorable long enough to have enabled the agent to carry out in the open scows stone enough to have supplied the place of that which was lost from the crib by the washing away of the sand at its bottom, this crib would, no doubt, have been permanently secured in its position, and would have had strength enough to have resisted ever afterwards the action of the lake sea. Unfortunately, however, before this new supply of stone could be effected, with the means at our command, another storm ensued on the 2d of October, of even greater violence than the preceding one. It washed the remainder of the sand from underneath the crib, and caused more stone to drop through the latticed bottom.

The roughness of the sea rendered it impossible to carry out in the scows more stone, to replenish what was lost; the scows would have been swamped in the attempt. The crib had now become deprived of its stone ballast to such an extent as to lose that *vis inertiae* which was necessary to enable it to resist the momentum of the lake waves, and it parted bodily three or four timbers above the latticed bottom. (In the report of Agent Bowers, of October 5, 1855, it is stated that the crib broke off "just above the upper grillage timbers." The position of the stranded portion of the crib did not then allow of an accurate examination upon this point. When I inspected the work early in November, I ascertained that the fracture took place three or four feet above the grillage bottom.) The bottom, together with the three or four courses of timbers next above

it, remained, from the weight of the superincumbent stone, firmly anchored on the bottom. The upper portion was driven on the 14 feet shoal towards the shore.

When I inspected this work after the disaster, I made a minute examination of the effect of the shock upon the iron bolts. Not one of them had been started from the position where it was driven. The appearance of the fracture showed that the whole tier of bolts, sixty in number, formed of the toughest wrought iron, one inch square, had been drawn asunder by the absolute force of tension.

The excellence in quality of the iron, and the adhesion of the bolts in the places where they were driven, could not have been more satisfactorily demonstrated by any experiment.

However much the loss of this crib is to be regretted, I deem it due to Agent Bowes and his party to say that it was, in my opinion, owing to no want of forecaste or exertion on their part to save it. The storm by which it was lost was the most violent of the season, and as violent, perhaps, as any that has ever occurred on this lake. Its effect, under the circumstances, was beyond human control.

A second crib had been brought so near to completion, that we expected to be able to finish it and sink it, also, in position before the close of the season. The misfortune to the first, however, required that the attention of the agent and his party should be given to the recovery, as far as possible, of the materials in the standard crib. This duty necessarily occupied them until the 7th November, when the advanced state of the season required the active operations upon this work to be closed.

The increased cost arising from the loss of 75 cords of stone, which were delivered under contract, at $11 50 per cord, and of recovering the materials from the stranded crib, has very nearly exhausted the balance of the funds which was to have been appropriated to the completion and sinking in position of the second crib. The work cannot, therefore, progress further until another appropriation shall be made in its behalf. I will remark that this second crib is bolted with round iron 1½ inch in diameter.

Experience has, we think, fully shown that, in order to succeed in the construction of a breakwater in a position exposed as this is to the violent action of the open sea, other appliances, and a different system from that to which we were unavoidably confined by the scanty appropriation granted in 1852, are absolutely necessary.

When a crib is built up to its proper height, and ready to be floated out to be sunk in deep water, upon the line designed for the breakwater, we should have the means necessary to ensure its proper alignment, and the deposit of the stone ballast within it, all within a few hours, say within

the space of a single day, or, if possible, within half a day; otherwise, the intervention of rough weather will often check the operation of throwing in the stone, and thus leave the crib in danger of being driven by the force of the waves from its moorings, and, perhaps, of being destroyed.

No crib can be considered as secured in its position until all the stone ballast designed for it is put in.

For this object, and for obtaining the stone from a distance at a reduced price, we consider it indispensable, in the future operations here, to have a sail vessel—say a schooner of 350 tons burden, which will cost about fourteen thousand dollars, ($14,000) completely rigged—and also a steam-power tug-boat of about 90 tons measurement, which, with her engine and machinery, will cost about fifteen thousand dollars ($15,000.)

The schooner would be employed in bringing all the timber and stone required for the work from the vicinity of Green Bay, by which means a full supply of both would always be ensured at a greatly reduced cost. The steam-tug would be used in carrying stone enough, at a single trip from the shore to fill each crib within six hours after its being aligned in position. Should any of the cribs be found to lose stone from the washing away of the soil at bottom during rough weather—a circumstance which is likely to occur within a short time only after they are sunk in position—this steam-tug could readily be laid alongside, and from her deck more stone could be thrown in, until a permanent *enrochement* were formed around the crib at bottom. This she could do in rough weather, when the open scows filled with stone could not venture out without being swamped.

By such an arrangement as this, the crib which was lost in October last, and which cost about six thousand dollars, could easily have been saved, and permanently secured in position. These two vessels will be found included in the estimate for future operations, accompanying this report.

In regard to the position and dimensions of the breakwater designed for this place, I must respectfully repeat the recommendation contained in my report, No. 73, of the 29th of April, 1855, namely: That it be placed upon the natural clay bottom, in twenty-five (25) feet depth of water, which will bring it about one thousand (1,000) feet outside or lakeward of the isometrical curve of twelve (12) feet depth; and I further recommend that the length of two thousand (2,000) feet, as was proposed in the original plan, be adhered to. In favor of the extent of roadstead, and sea-room for vessels in approaching it, that would be thus obtained, the following remarks were submitted in that report, viz:

"A vessel in rounding to in a gale of wind should not be subjected to run into less than 12 (twelve) feet before finding her final anchorage behind this breakwater; and one thousand (1,000) feet breadth of sea room and

roadstead is the least, I would respectfully submit, that ought to be provided—especially in view of a crowd of vessels which would often be seeking shelter at the same time from a northerly or northeasterly gale behind this work. For the reason given in treating of the importance of the Waukegan breakwater, vessels failing, for want of room in luffing, to make a harbor between the piers at the mouths of the rivers along the lake shore, would often be compelled to seek refuge behind the Michigan city breakwater. It would, indeed, often be their last resort and hope, situated, as it will be, near the southern extremity of the lake. I would respectfully submit for consideration the question: Is not the subject of *adequate sea room and capacity of roadstead* of more importance, in deciding this matter than that the arc of protection, (covering the pile piers or landings of the town,) secured by the length originally given for 25 feet of water, should be scrupulously adhered to?

"The greater facility for reaching the point of refuge, by the extent of sea room afforded, appears to me of leading importance. There is another consideration of importance which attaches to this question, namely: the greater and more unfavorable influence of ground swell, or action of the refluent waves,* upon vessels riding at anchor in the shoaler, than in the deeper water, secured by the respective positions proposed for the work. To render it efficient it must be hereafter extended on either plan, and I would recommend that its commencement be in the deeper water."

The answer of the Board of Engineers to the above remarks, hereto attached, marked H 8, seems to be based upon the necessity which existed from the want of an ample appropriation of limiting their second plan for this breakwater to providing merely for the accommodation and security of the local commerce of Michigan city.

I would respectfully submit, in answer to this, that any breakwater constructed at the public expense upon this lake, wherever situated, ought to provide for ample accommodation as a harbor of refuge during northerly and northeasterly storms, not only of the shipping of Lake Michigan, and the other great lakes having water communication with her, but likewise of the armed fleet which, in time of war, would evidently have to be maintained upon Lake Michigan.

The value of this commerce and the extent of the civil marine which is constantly engaged in promoting it, both of which require protection from a work of this sort, may readily be inferred from the statistics exhibited in the previous and subsequent parts of this report.

It will there be seen that the value of the commerce and tonnage which

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* *Under tow*, as it is sometimes called in nautical phrase.—J. D. G.

were afloat upon this lake, in the year 1855 alone, amounted to the mense sum of $218,297,348 78—that is to say, two hundred and eigh millions two hundred and ninety-seven thousand three hundred and f eight dollars and seventy-eight cents—was the amount of capital actu afloat on the lake during the navigable season of 1855, and directly i ested in the work under consideration. Had such a breakwater a recommended then existed, there was scarcely a vessel that was exp to the violent and destructive gales which occurred during that se which would not have sought refuge behind it rather than to have incu the hazard of attempting to make a harbor in any of the narrow-mou rivers along the lake coast. We have already dwelt upon the difficult entering in safety these rivers during severe northerly and northeas storms, and have explained the cause.

The value of the commerce and tonnage afloat on Lake Michig shown as follows, viz:

1. Chicago, Ill.	Value of imports by lake,	$100,752,304	41
2. Do.	Value of Exports by do	34,817,716	32
3. Waukegan, Ill.	Imports by lake	528,319	87
4. Do.	Exports by do	491.408	00
5. Kenosha, Wis.	Imports by lake	2,547.668	00
6. Do.	Exports by do	2 460,267	00
7. Racine, Wis.	Imports by lake,	3,347.981	43
8. Do.	Exports by do	686,496	17
9. Milwaukie, Wis.	Imports by lake	18 860,298	50
10. Do.	Exports by do	14,863,482	91
11. Sheboygan, Wis.	Imports by lake	6,749,461	00
12. Do.	Exports by do	1,003 564	00
13. Manitowoc, Wis.	Imports by lake	305.126	00
14. Do.	Exports by do	446,499	40
15. Michigan City, Ind.	Imports by lake,	61,267	00
16. Do.	Exports by do	10,819	00
17. New-Buffalo, Mich.	Imports by lake	30,019	50
18. Do.	Exports by do	18.878	14
19. St. Joseph, Mich.	Imports by lake	166,337	75
20. Do.	Exports by do	207.170	00
21. Grand Haven, Mich.	Imports by lake	1,752.160	14
22. Do.	Exports by do	1,199,468	00
23. Estimated value of the imports, exports and tonnage employed therefor of all the other ports of Lake Michigan than those enumerated in our statistics, being Port Clinton, Port Washington, Two Rivers, Kewaunee, White Fish Bay, Dougall Harbor, Mackinaw, Monastique, Beaver Harbor, Big and Little Traverse Bays, Manistee, Marquette, White River, Muskegan Harbor, Kalamazoo River and South Black River, in the aggregate for the year 1855—a low estimate		9,850,000	00

24. Estimated value of the imports, exports and tonnage employed therefor of all the Ports of Green Bay, including Green Bay Harbor, Big and Little Sturgeon Bays, Peshatego River, Menomonee River, Cedar River, Little Bay de Noc, Big Bay de Noc—a low estimate	10,530,000 00
25. Value of the tonnage of Chicago, Ill	1,088,801 74
26. Value of the tonnage of the other enumerated ports of Lake Michigan, from B to M, or from Waukegan to Grand Haven, inclusive	779,334 50
27. Value of the tonnage of Detroit, and of the ports of Lakes Huron, Erie and Ontario, *via* the Welland canal, engaged in navigating Lake Michigan in trading with her ports, for the year 1855	4,742,500 00
Total value of commerce and tonnage actually afloat on Lake Michigan, in 1855, which were interested in the construction of this breakwater	218,297,348 78

It is not, then, for the local commerce of Michigan city alone that this breakwater is designed, respectable as that commerce will presently be shown to be, although unaided by any work calculated to facilitate her lake-wise trade.

But even apart from the above considerations, there is a local interest in this contemplated improvement, of a magnitude and importance extending far beyond any exhibit which, so far as we know, has been made in any of the public reports on this subject. It is an interest which extends to the whole State of Indiana, and indeed, in a very important degree, to the northern portion of Kentucky.

Michigan city is situated at the lake-coast terminus of the New-Albany and Salem Railroad. This railroad is 278 miles long, and lies entirely within the State of Indiana. It commences at New-Albany, which is situated on the Ohio river, nearly opposite Louisville, Kentucky. It runs thence in a direction nearly north, passing through La Fayette and Indianapolis, and dividing the State of Indiana into two sections, very nearly of equal area, and terminates at Michigan city, which is the only lake-port belonging to this State. It is very important to the agricultural interests of this State that her products should here find a good harbor for their safe transmission by lake navigation in seeking the eastern markets. Without a good harbor at th[illegible] ns of the railroad, a transhipment cannot be safely made, a[illegible] now compelled to continue the transportation of his whe[illegible] products to Detroit by railroad, at an expense much grea[illegible] be done for by lake shipment. We estimate, on caref[illegible] per cent. would be saved on the present cost of this tr[illegible] was a good harbor at Michigan city to render a tran[illegible].

It is to relieve the people of Indiana from this additional expense that they are so desirous for the improvoment in question.

Whenever the New-Orleans market becomes glutted by the great quantity of grain, &c., drawn thither, and which always causes prices to fall it becomes the interest of the agriculturist of the northern part of Kentucky to seek the markets of the northern Atlantic seaports to dispose of their grain. This is, indeed, not unfrequently the case, and they are dependent upon this New Albany and Salem Railroad for its transportation to Michigan city, which is the nearest lake-port for them. Hence they are directly interested in this breakwater, because it will make a safe harbor for the transhipment of their property lakeward, in search of the best market.

I regret that I have not been able to obtain the statistics in detail of the amount and value of the various articles of commerce that reached Michigan city by this railroad in the year 1855. I hope to be able, however, to present them in my next report.* From careful inquiry I believe the value must have amounted, in the year 1855, to full twenty-five million dollars. (Say $25,000,000.)

This, then, may be assumed as an approximate estimate of the value of the local trade which is directly interested in the construction of this breakwater. Great as this interest is, it is by no means commensurate with that of the commercial community of these great lakes, taken in the aggregate, whose commerce and shipping need such a harbor of refuge and ready access, in times of perilous storms, which occur frequently on this lake, and every year, for the want of such protection to the shipping, cause a great destruction of human life and of property.

In time of war, no navy could be sure of maintaining its prowess upon this lake, or of extending the necessary protection to its coasts, without the benefit of such harbors as would be formed by works of this sort, behind which it could find a ready and safe refuge during these violent gales.

The only conflicts we have ever had with any power, where fleets were opposed to fleets, occurred on those lakes. In case a war should unfortunately occur again between the same powers, the greatest trial of naval strength between them would, undoubtedly, be upon these lakes. These conflicts, by deciding the mastery afloat, would also go a great way towards deciding that of the adjacent coasts and lake ports; and both powers being within ready reach of these unlimited resources, which are the real elements of strength in war, would be enabled to deal out, each against the

* *November* 15, 1856.—The exhaustion of the appropriation for the Michigan City Break has deprived me of the means of obtaining these statistics for this year.—J. D. G.

other, a power of arms afloat that could scarcely be equalled on the great ocean. Each would then, undoubtedly, vie with the other in endeavoring to have the superior armament. Where naval skill, physical strength, and national bravery were equal, supposing the one power to neglect and the other to provide harbors of safe refuge for her armed ships against the violent lake storms which often occur, the conclusion is evident that the mastery would thereby be ensured to the latter.

Since I have been stationed here I have been deeply impressed with the importance of giving due attention to these elements of military defence on our extended lake frontier. They are but the prudent preparations against the vicissitudes of war, which every government should be mindful of in time of peace; and the people of these lake-bordered States, who have so cheerfully and so liberally contributed their share towards every necessary preparation for the military defences of the national Atlantic border, feel that the timely protection of their commercial cities, and of their homesteads in the northwest, should not be neglected.

I would earnestly recommend to favorable consideration the economy of planning the works for harbor improvements at those ports on this lake which would become important *points d'appui* in time of war, in a manner to combine the requisite accommodations for the civil marine engaged in commerce in time of peace, and for our naval ships in time of war. A very small proportion, added to the expense requisite for the first-mentioned object, will accomplish both, and give to these works that national character which will always entitle them to the fostering care of the country. The great advantage of this system would be that the first and most necessary element in the military defences of this extensive lake coast would be secured in time of peace. To defer this important measure until war occurs is but to point out to the enemy our vulnerable positions, and thus enable him to seize upon them before the requisite defences can be perfected.

I submit the following estimate of the cost of the proposed breakwater, assuming that it is to be two thousand (2,000) feet long and 30 feet wide, and to be placed in water 25 feet deep, and to be 32 feet high from bottom to top, or to rise 7 feet above the water surface.

1. *Estimate of the cost of a single crib, 30 feet long, 30 feet wide, and 32 feet high from the bottom [illegible] the flooring [illegible].*

For 6,210 lineal feet of white o[illegible] timber, hew[illegible]ed, 1 foot square, at 22 cents per foot................	$1,366 20
For 2,160 feet, board measure, of white-oa[illegible] [illegible]ies thick, at $20 per M..................	43 20
For 8,060 pounds of round bolt [illegible] cents per pound	322 40

For 164 pounds of wrought iron spikes, 3-8 by 3-8 of an inch square, at 7½ cts. per pound	
For 176 cords of boulder stone, for crib ballast, at $10 per cord	1,7
Estimated cost of materials	3,5
Superintendence and workmanship	1.2
Add 10 per cent for contingencies, including meteorological instruments, as detailed in the estimate A 17, under head of Chica o harbor	4
Estimated cost of one crib, 30 feet long, 30 feet wide, and 32 feet high	5,2
2. Then, 67 cribs, at 5,220 50 each	350,3
3. For the purchase of one schooner of 350 tons burden, with her rigging.	14,0
4. For one steam-tug boat, complete	15,0
5. For machinery and tools, in addition to those on hand	5,0
Estimated cost of the Michigan City Breakwater, Indiana,	384.3

It would require five years to complete this work; and as the stoc timber for one-half the work should be procured in advance, in orde benefit by seasoning, I would recommend that the yearly appropriatio the work be as follows, viz:

The 1st year	$100.000 00
2d year	71,094 50
3d year	71,094 00
4th year	71.094 00
5th year	71,094 00
Total, as above	384,376 50

Michigan City is a port of delivery for foreign importations, and bel to the collection district of Chicago.

There is a deputy collector stationed here. There is a coast light-h here. No duties were collected here in the year 1855, nor for several y previous, for want of a harbor to secure the safe landing of freights.

The number of arrivals and departures at this port, in the year 1 was 180.

The amount of tonnage which arrived and departed during that year was 8,700 tons. The value of merchandise received at this port, during the year 1855, was	$2,177,13
The value of merchandise shipped from this port in 1855, was	1,772.95
Total value of receipts and shipments at the port of Michigan City, Indiana, in the year 1855	3,950.09

The above sum does not, of course, include the valuation of merchandise and agricultural produce which arrived at Michigan City by the New Albany and Salem Railroad, nor the merchandise which arrived there from Detroit and Chicago, and which was forwarded thence by the aforesaid railroad into the interior of Indiana and Kentucky.

As before stated, that merchandise was deprived of the advantage of lake shipment for the want of the contemplated breakwater.

ST JOSEPH HARBOR, MICHIGAN.

This harbor is at the mouth of the St. Joseph river, which is one of the boldest and best rivers tributary to Lake Michigan. It runs through the fertile counties of Branch and St. Joseph, in the State of Michigan, then through the counties of Elkhart and St. Joseph, in the State of Indiana, and then again enters the State of Michigan, and runs through the county of Berrien in that State, within which it debouches into Lake Michigan. It waters a country more than 150 miles of lineal extent, rich in agricultural resources, and deeply interested in the improvement of the harbor at its mouth.

This interest extends to both the States of Michigan and Indiana. The great volume of water ejected at its mouth into the lake, gives a more than ordinary advantage in keeping the harbor entrance open, when once the piers shall be extended out to a proper distance. These are properties which we think entitle this harbor to particular favor, because they will operate to aid greatly in the object to be accomplished, and thus diminish very much the usual expenses of dredging.

The pier work to form this harbor is in part, perhaps, the oldest of any on this lake. It was begun at a time when there was but little practical experience on the subject, and shows in some of its parts the total inefficiency of cribs that are built thirty feet wide, with cross-ties of round timber, often not more than 8 or 10 inches in diameter, bark and sap included, and without any support at the middle, from a longitudinal wall running midway between the two outside longitudinal walls; seven hundred feet in length of the north pier were originally built in this way.

It required, as we see on inspecting the work now, but a moderate degree of decay in these cross-ties to cause fracture at the middle from their own weight.

Instead of using iron bolts as the chief fastenings [illegible] together, the custom of that period was to depend mostly upon woo[illegible]ins, or *treenails*, for this purpose. I have never known an instanc[illegible] this has been done in structures of this kind that it has not pro[illegible] [illegible]
Experience and observation show that the [illegible]

is the best and cheapest material for this purpose, and, moreover, there is economy in the liberal use of it, especially where a pier is ex to a strong action of the lake waves.

After the cross-ties of this portion of the pier gave way and cause outer walls to be deranged, thus causing openings which let the sea thr the action of the latter, with the sand driven along by it against wooden bolts or treenails, has actually worn them away, and destroye union of the timbers which they afforded when new; hence, notwiths ing all the patching up of this part of the north pier of this harbor w has been done, the whole of it must now be torn away and new pier- built in its place.

The estimates we present herewith provides for this measure; the structure to be 20 feet wide, and in accordance with the drawings in G. No. 19,* herewith presented.

The remaining portion of the north pier was built 25 feet wide. lakeward portion is 436 feet long and is in good condition.

The south pier was built 24 feet wide, except one crib of thirty fe length at its lakeward extremity which is 25 fe t wide. This pier constructed in the same defective manner as the north pier, and is very dilapidated state, so that the sea in high winds makes a breach thr it near its junction with the lake shore, and makes a deposit of sand w the harbor. So bad is its condition that a portion of this pier whic tends from its angle out to its lakeward extremity, must be torn awa a new pier be built. This portion is 350 feet long.

I recommend that a new pier 20 feet wide be constructed on the side of this one in lieu of the above-mentioned portion, and that the portion of the old one be then torn away.

In my annual report for last year I recommended that the suggestio Agent J. R. Bowes, which was concurred in by the Board of Engineer an extension of the south pier six hundred feet lakeward from its pr terminus should be adopted.

Since the date of that report, however, a new and very accurate su minute in every particular, has been made of this harbor. It was do August, 1856, under the direction of this office, by Assistant Joh Mayer.

A duplicate of it will be forwarded as soon as it can be finished fo use of the engraver.

By reference to this map it will be seen that the result of this su

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* A duplicate of this drawing is in the hands of the Secretary of the Senate. prepar the engraver.—J. D. G.

proves that the entrance to St. Joseph's harbor is in much better condition in regard to the depth than has heretofore been supposed.

A draught of not less than 12 feet can be brought entirely in with four hundred feet width of sea room opposite to the extremity of the north pier, and with not less than 250 feet of sea room before the extremity of the south pier is reached.

It does not, then, appear necessary to extend the south pier as much as 600 feet lakeward of its present terminus. An extension of 320 feet will pass the shoal of less than 12 feet of water and reach to that depth, and I would recommend that this should be the limit of said extension until the operations of nature shall show that more is requisite.

The renewal above recommended and this proposed extension will require 670 feet of pier work for the south pier. It will increase the width of the harbors between the piers to 290 feet,* by placing the renewed portion 40 feet to the southward of the present decayed portion. This will allow a space of 15 feet between the old† and the new portion, which will be required for the convenience of a passage, while the new work is going on. The proposed increased width of channel-way between the piers will be a great convenience to navigators in entering the harbor during certain winds, and the bold current of the river in times of fullness will, we think, fully justify this plan.

It will be seen that, owing to the great width of St. Joseph river, opposite to and above the town—varying from 750 to 1,200 feet—it is for the most part not more than 5 to 6 feet deep. It will no doubt be necessary at a future day to contract the width of the river here by close piling to extend eastward from the upper end of the United States north pier, say to about 450 feet. The increased velocity of the current will then preserve a sufficient depth of water opposite to the town.

The new pier work required for this harbor will then be as follows, viz:

1. Renewal of a portion of the north pier	700 feet.
2. Renewal of a portion of the south pier	350 "
3. Extension required to the south pier	320 "
Total length of new pier work required	1,370 feet.

This pier work will be in an average depth of 15 feet water. The cribs will, therefore, under the rule of the Board of Topographical Engineers, be 20 feet high, and 20 feet wide.

* The present width between the piers is 250

† The width of the outer crib of this old rotten [illegible] ie new one will be 20 feet.—J. D. G.

Upon the above data the following estimate is presented for this w It amounts to $22,214 35 less than the estimate of last year, for the sons that the survey lately completed has caused a reduction of 280 fe the proposed extension of the south pier, and the action of the sea swept away a portion of the rotten work of the south pier, so as to di ish our estimates for removing this work, from $25 to $20 per linea for the whole.

The following estimate is presented for this work:

1. *Estimated cost of one crib* 32 *feet long*, 20 *feet wide, and* 20 *feet*

For 2,530 lineal feet of pine timber, hewn 1 foot square, at 18 cents per foot....	$45
For 880 lineal feet of oak timber, hewn 1 foot square, at 22 cents per foot........	19
For 1,462 feet, board measure, of white oak plank, 3 by 8 inches, for flooring, at $20 per M.	2
For 3,319 lbs. of wrought iron for bolts, 1 inch square, at 4 cents per lb.........	13
For 137 lbs of wrought iron spikes to fasten the flooring to the sleepers, to be 3-8 by 3-8 of an inch square, at 7½ cents per lb.	1
For 63 cords of hard boulder stone for crib ballast, at $10 per cord............	63
Cost of material for one crib	1,45
For carpentry, labor and superintendence	40
Sum	1,85
Add 10 per cent. for contingencies	18
Estimated cost of one crib	2,03

2. Then 1,370 lineal feet—42 26-32 cribs of 32 feet long, which, at $2,036 84 each	$87,2
3. For tearing away 1,050 feet, lineal, of old pier work and removing the material at $20 per foot	21,0
4. For a set of meteorological instruments, as per item 6 of estimate A 20, under the head of Chicago harbor	2
5. For dredging 5,540 cubic yards of sand near the end of the north pier, at 20 cents per cubic yard	1,1
Amount of appropriation required for St. Joseph Harbor, Michigan	109,5

The small balance of the former appropriation of 1852 has already expended in mending the worst places in the old rotten piers, an making the recent survey of this harbor.

I would recommend that the above sum of one hundred and nine t sand five hundred and forty-two dollars and seventy-one cents be div into three annual appropriations, as follows, viz:

1st year	$50,000 00
2d year	35,000 00
3d year	24,542 71
Total as above	109,542 71

The larger appropriations the first and second years are advisable to enable us to procure materials in advance and thus ensure the timely completion of the work.

If this harbor be not promptly attended to it will be soon destroyed by the action of the sea upon it in its present decayed and weak condition.

St. Joseph is a port of delivery for foreign importations, and there is a deputy collector stationed here. The port belongs to the district of Detroit. There is a coast light here. No duties were collected here in the year 1855, nor in 1856.

The accompanying statement, marked K 1, shows that the enrolled tonnage belonging to this port on the 31st December, 1855, consisting of one brig and 10 schooners, amounted to 1,300 tons. The number of arrivals and departures during the year 1855 was 1,224. Amount of tonnage which arrived at and departed from this port in 1855 was 134,640 tons. Average number of arrivals per day, during the season of open navigation in 1855, four. Average amount of tonnage arriving and departing per day during the season of open navigation in 1855, 440 tons.

The value of merchandise received at this port in the year 1855, and the enumeration of the articles thereof was, as shown by the accompanying statement, marked K 2	$166,337 75
The value of merchandise shipped from this port in the year 1855 was, as shown by the accompanying statement, marked K 3	207,170 00
Total value of imports and exports at St. Joseph in the year 1855	373,507 75

The harbor of St. Joseph is, from its position on the lake coast, one of the easiest, for vessels caught in northerly or northeasterly gales, to enter from either the eastern or western coast of Lake Michigan.

Its works ought not to be allowed to go to decay, for the whole commerce of the lakes, as well as the farmers of the counties in Michigan and Indiana, above enumerated, are deeply interested in its preservation.

EARLY HISTORY OF SHIPBUILDING IN NEW-YORK.

(*Continued from page 274.*)

During the war, the ship-builders who remained at New-York wer unemployed. In addition to the immediate demand of vessels for c ing on the internal trade, there were thirty-four privateers built and out, many of which will long be remembered with pride on this side c Atlantic, and with chagrin on the other. It would fill a volume to r their superior qualities and wondrous achievements. We cannot space, in this connection, to do more than furnish the list in alphab order, which is as follows:

General Armstrong, Anaconda, Arrow, Black Joke, Experiment, B min Franklin, Flirt, Galloway, Gipsey, Henry Guilder, Hero, H Holkar, Invincible, Jonquilla, Jack's Favorite, Paul Jones, David P Marengo, Mars, Morgiana, Prince Neufchatel, Patriot, Retaliation, mond, Rover, Scourge, Saratoga, Shark, Teaser, Gov. Tompkins, Wa Young Eagle, Yorktown.

The merchants and ship-builders of New-York having learned d the war that Britania did *not* rule the waves. As soon as the smoke smell of battle had subsided, and a treaty of peace was concluded, prepared to embark with renewed energy in the flotative art, and building again revived. But the mercantile community having bee long deprived of the fruits of their enterprise and industry by the that they lost sight of improvements, and the watchword be small tonnage and large cargo, unmindful that the tonnage vessel was neither a sure or a safe criterion for her carrying perties. Entertaining such views, it was not surprising that very after the war the size of vessels should increase much faster than their nage. 400 tons, which had, previous to the war, been regarded as a large vessel, was now looked upon as the proper size for a merchant The ship William and John, of 400 tons, was built by Mr. Bergh after the war. Adam and Noah Brown built the Ontario, of 527 This vessel was regarded as superior in quality as she was in size. tain Depuyster commanded her. One of the peculiarities of her cons tion consisted in the amount of deadrise her bottom possessed. It been usual to make the bottom quite flat, and to swell the bilge at its per termination beyond the extreme breadth above water, and thus from view above water the real breadth of the vessel; but the On was not of this class, and was therefore regarded as a step in adva She had 18 inches deadrise, which deprived her model of the protub ing bilge. She carried 1100 tons of China cargo, was owned by Th

H. Smith. She made three successful voyages, and was lost on the fourth by grounding on a reef with a pilot on board, when coming out of the port of Delhi, island of Timour, in 1818. This ship, in going from the Cape of Good Hope to New Holland, with a full cargo of cotton, sailed 220 miles in 24 hours, for 19 consecutive days, and made the shortest voyage that had up to that time ever been made, and by making a short cut opened a new route which had not been previously traversed. About this time Mr. Eckford prevailed upon the government, for whom he had done so much, during the war, to build a war vessel in the navy-yard. Accordingly designs and plans were made, and a model projected. The Board of Navy Commissioners, although they approved the model of Mr. E., because of their incompetency to examine it critically, they were opposed to any innovation on what they had deemed to be their prerogative, notwithstanding the Board was void of intuitive talent and practical knowledge in nautical mechanism. After conforming to the whims and fanciful notions of the Board in the model, Mr. Eckford took the responsibility of altering the lines on the floor of the mould-loft, which alterations he did not think proper to give to the Navy Commissioners, and as a consequence, the Navy Department were never in possession of the model of the vessel. The building of this ship of the line by a private builder was strongly opposed by the Board, and although she was of superior model and construction to any ship of her class in the navy, yet it was determined and avowed by Commodore Rodgers, a member of the Board, that she never should go to sea while his influence could prevent it, and well he kept his word. The Board were chagrined at his defeat. Mr. Eckford's influence with the people was much greater than that of the Commissioners with the government. The construction of this vessel was regarded as one of the greatest achievements. Notwithstanding she was superior, in every respect, to any vessel of her class in the navy, she had cost much less. Such was the imprint made upon the public mind by this manner of building ships by private builders in the public yards, that from that time to this the public opinion gives this mode the preference over all others for the construction of a navy. The materials, being provided by the government, should be of the best quality, and the private builder having the most enlarged experience in the modelling of vessels, it is only requisite that the weights or amount of armament and stores be given him to enable him to give shape to a superior vessel.

The frigate President having been built by a private builder, gave the friends of Mr. Eckford great hopes that his ship, the Ohio, should be equally successful and equally honorable to the American name. It was not, however, until twenty years had elapsed, when Commodore R[illegible] had lost the preponderating power in the navy that the Ohio was se

sea, when she proved herself to be all that Commodore Rodgers, her g
est enemy, subsequently said—*a noble ship.*

In addition to the list of ship-builders already given, Stephen S
comenced business with John Dimon, Isaac Webb remained with
Eckford for a time, David Brown and Jacob Bell became partners, L
and Wilson also set up business on their own account. J. Morgan als
came a ship-builder, with two or three others, Aikman & Mullen,
Samuel Horner. Up to this time, about the year 1820, the year in w
the Ohio was launched, few improvements were made in the model o
of vessels, although steam had been successfully introduced on the Hu
in 1807, and up to this date Charles Brown had been regarded as the
above all others who could build steamboats. It was resolved, how
that it would be nothing amiss for others to try, when it was found
they could do quite as well. City improvements and increase of bus
drove the ship-yards up town. Isaac Webb associated himself with
Allen, a half-brother of Mr. Eckford, and opened their yard at the fo
Stanton-street. Although there were many fine ships built, there see
to be but little competition. The famous Liverpool packets were i
duced soon after the war. That pioneer—the Black Ball line—led the
for years, and was established by Isaac Wright and others. The
were substantially built, and had some reference to sailing in their ty
model. The regularity with which their voyages have been made,
given them an enviable notoriety, and an enduring fame. The prin
ships originally belonging to the line were the New-York, Courier,
fic, James Monroe, Orbit, Nestor, James Cropper, William Thom
Amity, Albion, Canada, and Columbia. They had become so well e
lished that in 1818 their average length of passage was:

To Liverpool	23	days.
To New-York	44	"
In 1819, outward,	25	"
" homeward.	31	"
In 1820, outward.	22	"
" homeward.	37	"
In 1821, outward.	25	"
" homeward	40	"
In 1822, outward,	23	"
" homeward	41	"
In 1823, outward	23	"
" homeward	29	"

Average for six years, from 1818 to 1823, inclusive:

Outward	23	days
Homeward	40	"

The shortest passage out, in the whole time, was made by the Canada, in 1823, in 15 3-4 days. All the passages of the Canada, outward, averaged less than any of the other vessels, which was 19 days, and her total homeward-bound voyages averaged 36 days, equalled, but not surpassed by the others.

For seven years, from 1816 to 1824, the average of the whole line was:

Outward	23 days.
Homeward,	44 "

Such were the performances of our ships on the North Atlantic in all seasons, and in all weathers, when New-York ship-building was in its infancy. In the opening up of this line, the enterprise was regarded by many as somewhat hazardous; but when a second line was formed, the [illegible]ug of the shoulders and shake of the head showed but too plainly that misgivings were at a premium. For a time, doubt and distrust remained above par; but, still they came. A London line, a Havre line, and additional Liverpool lines, were brought on, and as the ships increased in number, they increased also in size, and incredulity was finally at a discount.

In 1825 Mr. Eckford contracted with the Brazilian, Chilian, Columbian and Peruvian Governments to build four forty-four gun Frigates, and associated with himself in their construction, Isaac Webb & Co. Two of these ships he built in New-York, one in Philadelphia, and the other in Baltimore—their frames were of Live Oak. Two other frigates were shortly after contracted for and commenced for the Greeks, one only of which they were able to take; the other was bought by the Government of the United States. These two ships had White Oak frames, and were about the same size of those built by Mr. Eckford; they were named *Liberator* and *Hope*—the former built by Smith & Dimon, the latter by Christopher Bergh. The *Liberator* was selected by our Government, as the ship of their choice, and after purchasing her, called the *Hudson*. The sudden influx of work in the ship-yards of New-York, inflated wages far beyond the ordinary standard, and during the time of the Frigates' construction—although there were not many merchant ships built—the ordinary demand was kept up.

Immediately after the frigates were built, a reaction seemed to take place, and shipbuilding went down to minimum rate, the brisk times in ship-building during the years of 1825 and 1826, seemed to have been forgotten in the general dearth, freights were dull and the whe[illegible] commerce seemed to stand still, and all was motionless for a tin[illegible] was

not until two years had elapsed before nautical construction had reg its wonted vigor and was found in a healthy state. Just as Mr. Ec predicted, and it was his object to ward off this reaction, that he distri the work, part in Philadelphia and part in Baltimore.

The Liverpool packets notwithstanding the depression in business the building of the frigates, were constantly gaining favor on both sid the Atlantic, being commanded by energetic men. Several lines we ducted into public favor on the same terms as the Black Ball line, a ter a few years, they not only became known by their bunting, but regular in their day of sailing, as also their term of service as a line, was set down at seven years. The most prominent shipbuilders we lected for their construction, and while Smith & Dimon, Isaac We Co., or Brown & Bell were generally called upon to build the Live lines, C. Bergh, and subsequently Connolly & Westervelt became ested in the Havre and London lines of packets, and were the prin builders of those lines. Among the most prominent of the Liverpool of packets, was the *Independence*, owned by Grinnell, Minturn & Co. ship took the President's message to England for a succession of year sailing day being the 6th of March, she rarely had to wait more th day or two for the message, beyond her sailing time; Captain Ezra N so well known in the Nautical world, commanded her, and she almo variably made the quickest passage, and more than once made the Ea passage in fourteen days. The list of lines of packets was yet incomp New Orleans was in the progress of events classed among the comm marts, and a line of ships was built to sail on regular days from New to and from New Orleans; business increased in this direction, and a line was projected. The *Nashville*, *Huntsville*, *Louisville*, *Natchez* *Creole*, composed the new line.' Ficket & Crockett—afterwards Fick Thomes—built one of these ships. Isaac Webb and Co. built the *Nat* the only one of the line which was was without a full figure. Bergh one, and Sneden & Lawrence—who up to this time, had confined attention to smaller craft—built the *Creole*, while Brown & Bell buil fifth ship. This line of packet ships was built with poop deck cabins, a new feature in ship-building. The first type of model in the Live lines having been so completely successful, the travelling public had l ed to confide in them, as a safe means of transit both for property and sengers. So great was the number both of cabin and steerage passen that it was found necessary to adopt some new measures to accommo the tide of travel to the western world; the between decks became small for cabin and steerage passengers, with cargo. The flush deck place first to house and poop deck cabin, then to top gallant, forecastle subsequently to a succession of houses from fore to main hatch. It

somewhat difficult, however, to satisfy the public mind, that this innovation was to be a positive improvement and benefit. The means, however, adopted to accomplish this, was somewhat novel. Having completed the first vessel to their own satisfaction, with cabin on deck, the owners found it difficult to book passengers to fill it in this elevated position. A scheme was now resorted to that succeeded admirably: a few distinguished and well known nautical and commercial men were invited to take passage in the newly arranged vessel, with an unusually large supply of stores, both solid and fluid, and in making up the list, the wines were not forgotten. With a free passage, a full allowance and fine weather, it was not at all difficult to convince these distinguished guests of the advantages of poop deck cabins; but it was not only essential that they should be favorably disposed toward this enlargement of the topsides without increasing the bottom to carry it, but the public must be told by these competent and *disinterested* judges, that increased depth furnished increased safety, and that poop deck cabins were not only the most comfortable, but the safest under all circumstances; the card was forthcoming, the publication of which proved quite sufficient to satisfy all who had misgivings on the subject of poop deck cabins. The same means has often since been resorted to, in order to palm off upon the public that which was far from being a positive benefit to those who go down to the sea in ships. Up to the time of this innovation, the packet ships had but two decks, and as soon as the innovators had fairly settled down into security, the practice became general, to burden those parts of the ship with top-work, which were least able to bear the excess of depth. Rival lines, however, enabled the public to enjoy the benefit of good ships and comparatively short voyages. But with all the improvements in model, and advantages of increased size of the Liverpool packets, the voyages of the *Oliver Ellsworth* and *Independence* were not surpassed. Whatever was gained in model and size, was lost in the increased depth, and by the increased draught of water. The *Sheridan* was built in 1838, by Isaac Webb & Co., for Messrs. Goodhue & Co., and was then supposed to be too large for a Liverpool line, (895 tons,) she was placed in the China trade. She was considered a fine as well as a fast ship, and has made for several consecutive days on different passages, 270, 275, 285, and 290 miles in twenty-four hours. At one time, on a western passage, in twenty-three hours, she sailed 293 miles; she stowed 1900 tons of China goods.

Although the passage of fourteen days between New [illegible] Liverpool was and still is of rare occurrence, for reasons whic[illegible], it has since been made by the *Patrick Henry*, (907 tons,[illegible] & Bell; by the *Montezuma*, (1070 tons,) and by the *S*[illegible] tons,) and by others of more recent date. But we mu[illegible]

pool lines for the present, to follow the progress of steam. We hav ready discovered that the mysteries of Steam Boat building, were k to others than Charles Brown, the first builder. Among the triu achieved by steam on the waters of New York and its vicinity, wer *James Kent*, *Chancellor Livingston*, by Isaac Webb; *Benjamin Fra* by Brown & Bell; the *Thistle*, by Smith & Dimon; the *Hudson* *President*, *Providence*, *McDonough*, with a fleet of others were added to the list. The exclusive rights granted to certain individu navigate the Hudson river by steam, was found to be unconstitutiona as a consequence, the waters were declared to be free; since then this river has been the race course for fast Steamboats, on account of its the great thoroughfare to the inland seas of the North and West.

Robert L. Stevens, a man of some knowledge in engineering, but c distinguished on account of the great wealth he possessed, unde to improve the speed of the boats on the Hudson, and while he inv other men's ideas, with his own money, he secured a notoriet eval with improvements in steam propulsion; his fame spread everyw and he was at once accredited for a vast fund of knowledge which h never attained, and finally succeeded in prevailing upon the Govern to allow him to carry out his project of building a war ste for Harbor Defence, to be both shot and shell proof, and after yea delay in maturing his plans, left the vessel at his demise far from completed. Mr. Stevens during the first twenty years of steam prop on the Hudson river, experimented largely in the elements of securin maintaining speed, and with the aid of the best engineers, secured ir tant results, while connected with his name stood recorded some o most egregious blunders in engineering, into which he was drawn b ambition to be identified with every notable movement in steam pr sion. His great wealth invited the genius of the country to submit improvement to his inspection, which gave him an opportunity for pr ble investment rarely enjoyed. There were, however, also engage navigating by steam—those who believed that they could do quite as without, as with the patronage of Mr. Stevens, and who dared to think act independently. The consequence was, that he withdrew from river as a competitor, and sought other channels, where wealth and a tion could riot without control.

By the death of Mr. Stevens, his war steamer must be finished by hands, a circumstance alike to be regretted both by the Government his friends, inasmuch as she will not answer the object designed.

TRADE AND TRAVEL IN SAILING SHIPS

It is a law in mechanics, that action and reaction are equal, nor is it less true in reference to Commerce; the busy marts of trade abundantly prove this. At this particular juncture, when our ships are being laid up for want of employment, the question is propounded, what use shall we have for sailing ships, freights are too low to justify an investment of more capital in building sailing ships, and our transatlantic neighbors are sweeping from us that which has been profitable for the past 30 years, in their screw vessels. That freights are dull, we are ready to admit, and that the conveyance of emigrant passengers is not likely to be a source of profit, because of their unwillingness to take passage in sailing ships, we have no disposition to deny; these facts are too palpably plain to admit of a doubt. But why this declension? Why the transfer of trade and travel from the *three decker liner* to the screw steamer? Is there not a cause? We say there is, and shall endeavor to point it out. There are two elements in trade which serve to regulate all commercial transactions; so also in mechanics there are two simple elements by which the value of all agencies, whether natural or artificial are measured, or their importance determined. Time and money on the one hand, and speed and power on the other; these principles are as plainly operating now as when the polarity of the magnet was first discovered. But the season of prosperity is not the time to heed admonitions, however correct the principles upon which they are based, or important the considerations involved. When merchants are making money in the capacity of ship-owners, they have not the leisure to pause and listen to the warning voice of the *look out*, that there may be breakers ahead.

When the owners of freighting ships depart from the well known principles of flotative art, then the downward tendency of science in nautical construction commences in sea-going vessels, or those engaged in the transatlantic department of commerce. So long as there are no rivals who entertain and carry out correct principles of construction, the American merchant ships are, and must of necessity be, successful while employed. It has not been regarded as inappropriate to perform two kinds of service in the same vessel. But a higher degree of civilization is in progress, and is being daily attained—a greater division of employment as a consequence becomes necessary, both on sea and land. It has been found, and is within the experience of merchants, that it is of less consequence to detain the bale of cotton, the barrel of flour, or the case of hardware, than it is the passenger, whether upon the railroad or the ship; the business portion of the travelling public can wait for their goods, but are not willing to wait

for their passage. It was a feverish state of the public mind, at bein detained on railroad journeys and long passages, which gave rise to mu murings, and which induced an effort at improvement in the divisions c labor; first of the iron horse, and next by express-trains for light freig and passengers. At first the enterprise was opposed by business me being regarded as unprofitable and uncalled for; but a few months servi sufficed to show that it was a move in the right direction, and now, i stead of there being but one class of carriers on rail roads, there are fou The Freight train, the Way train, the Express train, and the Lightni train, and one would ask, where is the man to be found who would se to embody the services of these four classes into a single train, howev frequent their times of starting, or however powerful the locomotive l which they may be driven?

The principles of transporting freighted goods is the same, whether the ship or in the rail road car, and while a thirty days voyage may n serve to deteriorate the value of a bale of cotton, a cargo of timber, or of barrel of flour, it does very materially enhance the cost of passage to t traveller. In addition to the increased price in value, of passage tin added to that of the money charged, he is also subjected to the annoyan of a longer term of sea sickness on ship board. Can any one suppose f one moment, that emigrants are so far blinded to their own interests, as take passage in a sailing ship, when they can come across the Atlantic i a screw steamer, in about one-half or two-thirds of the time? But, it ma be said that the price of passage is much less in the sailing ship than i the steamer. Very well; but there is the element of time, which ha value one must remember; and there is no emigrant passenger who doe not set a price per day for every day he is kept on ship board, as well a first class passengers, and whether the price be ten cents or ten dollar one dollar or one hundred dollars per day, it has a fixed value in the min of the passenger, whether he be on the list of first, second or third class and when by the passenger's own estimate of dollars in ticket, and dollar in time, added together; unless the sailing ship has the lowest charge, h prefers the steamer. But there are other reasons: the risk is less—be cause for a shorter time, and the suffering from sea sickness is diminishe for the same reason. In the face of so many good and substantial reasons is it a matter of surprise that our lines of packet ships should be unable t find profitable employment, and be compelled to return home with an emp ty steerage, and carrying an empty and expensive topside both in first cost depreciation and wear and tear upon the bottom, which without it woul have an amount of weight in freight equal to the weight of this same top side. Can the merchant and ship-owner longer doubt the propriety o building a different type of vessel to meet the wants of the age? We hav

repeatedly set forth the inevitable consequence of being guided by the deceptive advantages offered by the tonnage laws, and now we are beginning to reap the bitter fruits of bad dimensions, in unprofitable ships; so long as this expensive and unwieldly portion of the ship could be filled with passengers, there was no room for any serious misgivings in the minds of those who study the ledger more than the ship; but now that the counting-house balances are on the wrong side, the ship-owner is willing to pause. The present inactive state of the commercial world, is, to a great extent, the result of a reacting influence consequent upon overtrading, we readily admit. But one of the principal reasons why our ships are unemployed, is because *they are not adapted to the wants of trade and travel.* The American people will see the end of an enterprise, before they will pause, or change their course. When ocean steamers became the order of the day, their type and design was left to unskilled hands—to men who did not possess the first qualification for the important task. As a consequence, our ocean steamers were unprofitable, because adapted to no specific service, it was little better than placing an engine, boilers and a pair of paddle-wheels upon a packet ship; they were not much faster, and had no more stability. Next came the mania for large ships, when the same fatal mistake prevailed; whereas it should have been the breadth of the vessel, with the length, which would have given the required increase of size. Then it was found that unless the ocean steamers carried a large freight, at increased rates, she could not be profitable. On the other hand it was discoverable that if she made long passages, she could not secure the patronage of the travelling public, and yet long passages was the certain result of large freights. This to a clear and unbiased mind, should have been sufficient to satisfy any man that in steam transit, freight and passengers must be separated, if they could by any means be made profitable. Yet ship owners were not convinced, and embarked more largely in these mixed and unnatural channels of trade. Steamers were built with 3 whole decks, which were covered with state-rooms, pantry and passage bulkheads, intended for the accommodation of hundreds of passengers of the first class, while a reservation was kept in the hold of all the space for freight which could possibly be spared. If the first edition of steamers failed to pay, the second could not surely, inasmuch as large ships, large men, and large pay from the Government were all combined to make this a National Enterprise; but strange to say, it was a failure. And now our merchants, ship owners and masters have the mortification of being driven to the wall by our transatlantic rivals. It could have been readily told how many passengers crossed the Atlantic—both in summer and wi[illegible] and to prepare state-rooms for hundreds, when, during seven [illegible] months of the year the list of passengers could be numbered by t[illegible]

to say the least of it, a piece of folly unworthy of business men. It is bu three or four months in the year that steamers can expect to go full o passengers, unless of a size adapted to the number of travellers. This ex pensive arrangement in state-rooms was not adapted to emigrant passen gers, nor yet to the storage of freight, and consequently must go empty unless filled with passengers of a peculiar type, and it required but an o dinary share of intelligence to discover that a steam emigrant ship wa much needed. Designs for a line like this were made ten years ago. Th of course interfered with the freighting vessel which had, like the steame been partially adapted to two kinds of service, and profitably adapted f neither.

Ship owners are now casting about to know what is to be done, chargin the want of employment for their ships, to the dullness of the times, to t entire absence of employment. We say that this is not the only caus No! *there is work enough even now*, for our sailing ships, if they we adapted to the service. It is just as essential that there should be fo classes of carriers on the sea, as on the land; there is the same necessi for sub-dividing the work of ocean, as of land travel, and even more; b cause the distance travelled is much greater. Steam vessels as at prese constructed, are only superior to sailing vessels on the ocean in the reg larity of their trips. When both are put on their metal and the circum stances have been equally favorable to both, the sailing vessel has prove the fastest, except perhaps in a single instance. The reasons are obviou the sailing ships which have proved so fast, are clipper ships, adapted speed, while the steamers, except in the instance referred to—althoug purporting to be—are not adapted to speed. Hence the reason of the being unprofitable. Our clipper ships like those engaged in the Atlant trade, have been built with too large topsides for the bottom they sail upo This operates against them in two ways: first, it increases their draugh of water beyond a just proportion; and second, it reduces their exponen of buoyancy below the paying standard. But for these disabilities, ou clipper ships might be made clipper propellers, and engage in the Med terranean trade and in the Whale Fishery. To be really profitable f this service, the greater portion of them are too large. Hence we say th it is not because there is not business for clipper ships, that they are u employed, but because of the want of adaptation of ships, and want o foresight in their owners. So also we say of the Atlantic freighting ship they are too large; not in tonnage, but in their depth of displacement.

Grain and Iron freights are too dense to be carried both in the hold an between decks, and unless emigrant passengers can be secured on th westward passage, they cannot pay a remunerating return with an empt steerage. This, as we have said of the business for the Clipper Ship, is n

entirely a want of trade, but of adaptation of vessel to the trade as it is. It would be taking a step backward, to undertake to bend the trade to fit the vessel; this can never be done. Emigrant passengers must and will go by steam so long as steamers are profitable, and if our three-decked sailing ships are not adapted to freighting and freighting alone, they had better be made so. The staple articles of our trade with Europe are corn, sugar, breadstuffs, timber and heavy hardware goods. With regard to these, time is of less consequence than the price of freight. A week or two more or less is of little consequence to the bale of cotton, or to the barrel of flour; but a few cents are of material consequence when added to the price of freight.

Hence it is manifest that sailing ships can sail with freight cheaper than steamers can steam with it. This naturally makes a division of labor, and a diversity of types of vessel. The two-decked sailing ship for heavy freight on the stormy Atlantic. The screw steamer for emigrant passengers and light express freight. The clipper propeller for the Mediterranean trade, sufficient in itself if properly entered into with the right kind vessel, to employ a number of ships equal to one-third of all owned in the United States. Then we have the South American trade, which has not been attended to properly, or it would have been among the most profitable. The Russian trade has been hardly cared for, when it might and should be of the greatest importance. All these different trades require vessels of peculiar type. But there is another class of steam vessels we must not omit to name—a class in which this country can excel, notwithstanding John Bull is willing to link his national pride, skill and money in maintaining his favorite maxim that "Britain rules the wave." We mean steamers for mail and passengers only. Fast steamers has not only come to be a matter of convenience, but one of necessity. There is a variety of articles of trade which require to change hands quick, because time impairs their value; for passengers and mails, speed is the prime consideration, but the same principle which has operated to increase the size of both sailing ships and ocean steamers, is not applicable to this kind or class of steamers; it is not the great bulk of passengers and mails which is to make the mail steamer profitable, but it is the *rapidity of transit*, *frequency*, and regularity of mails, which is to make the passenger and mail steamer profitable. A steamer that can accommodate but 100 state-room passengers with the mail, and runs 450 miles per day, will make more money for her owners in a year, than the 5000 ton steamer can ma
less than one-half of the investment of capital, and no intelli
Builder or Engineer will doubt the feasibility of attaining an
speed equal to this performance, and that on a steam f 2000
of such steamers would carry more passengers than of

lantic lines now carry through the year, and could secure the mails at increased rates. Speed for passengers and specie is every thing; a v interest on a million of dollars, would nearly pay for the coal used. of four steamers would sail weekly from each side of the Atlantic. there are other channels of trade in which sailing vessels, with aux steam power, might be profitably engaged. The high price of be mands a large area for the supply of cattle; here is entirely a new which must be opened by some enterprising men.

So long as this country continues to furnish breadstuffs, cotto timber for the world, so long will our sailing ships find employmen be able to compete successfully with England, if they are adapted service required. It is manifest that ships will to the end of tim cheaper, (where time is not an element in the cost of freights, steam propelled vessels as now understood by the steam engin world.

The careful observer has but to look at the history of Ship Buildi this country, and he will at once discover that a new type of vess been demanded for every ten years of our commercial history. W now at the end of the era of deep sailing ships. We must either c our tonnage laws, or disregard them as a text book for the constructi vessels. The large clipper and three decked freight and passenger must not be seen on the stocks in our ship yards, and if the mer builder and master will carefully observe the laws of adaptation in p ence to the laws of tonnage, they will still find that sailing ships profitable investment, notwithstanding the number of English screv sels are on the increase, and may continue to be so, until it is found they do not pay, a matter of which there is great doubt.

Improvement in Ship Masts.—Mr. J. Brown, a mast maker, of I pool, Eng., proposes to improve mast making as follows: He make top of the masts, from the cap to the truss hoop, in the form of a tut wrought iron, similar to an ordinary iron mast, and continues the downwards in the form of four tapered arms. The lower part of the is entirely of wood, and the upper end of it is fitted into the tube as the hounds, where it abuts against a strong iron cross plate formed i tube. The tapered arms fit close to the wooden portion of the ma which they are securely fixed by iron hoops, or otherwise.

Table showing the Time of Departure, Arrival, Length of Passage, and Number of Passengers on each Trip of the Canadian Line of Steamers, the Property of the Montreal Ocean Steamship Company, 1856.

Steam Ships.	Departure from Liverpool.	Date of Arrival.	Passage. Days	Passage. Hrs.	No. of Pas'gers.	Departure from Quebec.	Date of Arrival.	Passage. Days.	Passage. Hrs.	No. of Pas'engers.
*North American**	April 23	May 7	14	1	155	May 25	June 5	11	7	126
Canadian†	May 7	May 21	13	10	189	June 7	June 19	11	8	131
Indian‡	May 21	June 3	12	11	152	June 21	July 2	10	10	139
Anglo Saxon	June 4 and 13	June 25	12	2	108	July 5	July 16	10	3	118
North American	June 18	June 30	11	20	187	July 19	July 30	11	1	104
Canadian§	July 2	July 15	12	10	173	August 2	August 14	11	9	115
Indian	July 16	July 27	10	19	182	August 16	Au ust 27	10	20	134
Anglo Saxon	July 30	August 9	10	5	174	August 30	September 9	9	23	117
North American	August 13	August 24	10	12	253	September 13	Septe ber 24	11	5	106
Canadian	August 27	September 9	13	23	212	Septe ber 28	October 9	10	19	113
Indian‖	September 10	September 22	12	9	205	October 11	October 23	10	7	132
Anglo Saxon	September 24	October 6	11	13	252	October 25	November 5	10	16	123
North American	October 8	October 22	13	9	305	November 8	November 21	12	22	102
Canadian	October 22	November 4	10	12	108	November 22	December 7	12	22	106
					2,660					1,163

*38 hours in the ice. †15 hours in the ice. ‡10 hours in the ice. §11 hours in a fog. ‖10 hours in the ice.

	Westward.	Eastward.
	12 days, 20½ hours	11 days, 2 hours.

of the Cunard Steamers for the year was—

	Westward.	Eastward.
	13 days 7 hours	11 days 12½ hours.
	11 " 22 "	" " 13 "
Steamers	12 " 16½ "	12 " 8 "
Ditto, *via* Southampton	15 " 0 "	14 " 12 "

COMMANDERS.

Anglo Saxon, Mr. Andrew M'Master.
Canadian, Mr. William Ballantine.
Indian, Mr. Thomas Jones.
North American, Mr. William Grange.

SPECIFICATION OF MACHINERY FOR STEAM REVENUE CUTTER.

Boilers.—Three in number—two main and one auxilliary boiler. Ma boilers to have three furnaces each, and auxilliary to have one furnace the same dimensions and of the same form as each of those in the ma boilers. Auxilliary to have all the necessary connections to enable it be worked with the others, when suppling steam to the engines, or sep rately to connect with the hoisting engines and steam pumps.

Main Boilers.—To be each nine feet, ten inches wide, twenty-five f long, and eight feet, six inches high to bottom of steam chimney.

Auxilliary to be three feet, six inches wide, otherwise to correspond w main boilers. All to have iron shells and bodies, and iron tubes plac ventically. Tube sheets, ½ inch bottom, 2-16 inch, and all other parts inches in thickness; to be double rivetted in all parts, except the furnac to be stayed sufficiently to stand a hydrostatic pressure of forty pounds p square inch in large, and sixty pounds in small boiler.

Tubes to be of iron, 2 1-4 inches outside diameter, 3 feet, 6 inches lon and No. 13 wire guage in thickness. The aggregate fire surface in t three boilers, to be about 5880 square feet.

Smoke Pipe.—To be 6 feet in diameter, and about 50 feet high fro grate bars, secured with two rows of braces.

Steam Chimney.—To be in two halves, each half forming part of ea of the main boilers, to be 8 feet diameter, and 2 feet high.

Covering for Boilers, Steam Pipes and Cylinders.—To be of hair fel one inch thick, fastened to woolen felting and canvass. Top of boiler steam chimney, and about three-fifths of the whole surface of felting abou boilers, covered with sheet lead, 3 lb. to the square foot; steam pipes an cylinders to have wooden lagging in lieu of the sheet lead, to be well fi ted and bound with finished brass straps.

Boiler Appendages.—Three safety valves, two of 6¼ inches diamete and one of 4 inches diameter; two stop valves on steam chimney, 1 inches diameter.

2 steam stop valves on small boiler; one to communicate with stea chimney.

3 check valves, 4 inches diameter.

3 surface blows, two of 2 inches, and one of 1¼ inches diameter.

3 bottom blows, two at 3½ inches, and one of 2¼ inches diameter.

1 steam whistle, 8 inches diameter.

1 cast iron plate around chimney on deck.

3 salinometres, complete.

12 guage cocks.
3 drip pans of brass or copper.
3 glass water guages.
2 ventilators, arranged for hoisting ashes through them.
2 sets of fire irons, complete.
Grate bars in two, complete.
1 fresh water apparatus for supplying ship.
3 sets of tube scaling tools.
7 flue brushes.
4 coal baskets.
4 ash buckets.
3 syphon guages—one for small boiler to have a double syphon.
2 pieces gum hose and pipes, for wetting ashes.

Sheet Iron Screen.—To be of No. 10 sheet iron, placed about 12 inches from smoke pipe, to protect adjacent parts of wood; this space to be properly protected from the weather by a sheet iron bonnet of No. 10 iron rivetted to smoke pipe.

Escape Steam Pipe.—To be of copper, $2\frac{1}{2}$ lbs. to the foot, 10 inches diameter, 15 feet high, with suitable finish at top.

Outboard Blow Valves.—To consist of two screw valves of $3\frac{1}{2}$ inches diameter; valves, seats and stems of composition, arranged so as to be conveniently worked in the fire-room, with an index to show plainly when the valve is shut.

Fire Room Floors.—To be of cast iron, $\frac{1}{2}$ inch thick in thinnest part.

Fire Room Ladders.—To be of wrought iron, leading to deck, two in number, and cast iron leading to engine-room; the latter to be of same pattern, and have similar hand-rails to that in the engine-room.

Engines.—Two inclined oscillating engines, one forward and the other abaft the shaft, inclined to each other at angle sufficiently less than 10 degrees to admit of a draglink between the crank pins, each being placed one side of the centre of the ship, to permit of this arrangement.

Bed Plates.—Two cast iron bed plates, cast hollow, of $1\frac{1}{2}$ inches thickness, of metal with the necessary flanges, ribs and hubs for the reception of the wrought iron columns and the trunion pillow blocks.

Cylinders.—To have a diameter of 50 inches, and a stroke of 6 feet, to be not less than $1\frac{1}{4}$ inches thick when bored. The steam chests, passages and trunions to be cast on the cylinders. Priming valves to be placed on cylinder top and bottom, to be not less than 3 inches diameter, and arranged to work with facility; steam passages to be not [illegible] 150 square inches in any part.

Cylinder Covers.—To be of cast iron, cast hollow, with ribs, metal to one inch thick, except ribs, to be 3·4 inch thick, and flange 1¼ inch thi The piston and stuffing box to be lined with composition both in gla and bottom of box, composition bearing for piston rod in lower part stuffing box, to be not less than nine inches; cylinder covers, stuffing-b and gland to be turned and polished bright, stuffing-box to have fixtu by which the glands may be conveniently screwed up, while the engi are in motion; oil cups to be placed on cylinder covers, for oiling linders.

Condensers.—One to each engine of the ordinary jet form of cast iro capacity to be not less than 45 cubic feet.

Air Pumps.—To be 38 inches diameter, and 30 inches stroke, sin acting, to be lined with hard roller sheet brass staving, not less than ¼ in thick.

Foot and Delivery Valves.—To have seats and guards of compositi and valves of India rubber with composition centres on which the val turns; area through delivery valves to be not less than two-fifths that the pump.

Feed Pumps.—One to each engine, to be not less than 6 inches dian ter and 30 inches stroke, to be fitted up with composition flanges, valv packing glands and rings; feed-pipes of copper, not less than 4 inches ameter, to be provided with suitable valves and cocks, of composition.

Hand Pump.—One of composition, to connect with bilge boilers, s and fire hose.

Bilge Pumps.—One to each engine, of same dimensions as feed pump with suitable pipes of copper, and valves and cocks of composition.

Air Pump, Buckets and Valves.—To be of composition, with arrang ment for screwing down the packing.

Air Pump Bucket Rods.—To be of best malleable iron, cased wi composition not less than 4 inches diameter at smallest part, and propo tionably swelled in the middle, to be turned and polished.

Air Pump Connecting Rod.—To be of best malleable iron, not le than 4 inches diameter at smallest part, and proportionably swelled in th middle, to be turned and polished.

Pillow Blocks.—To form portion of upper frame work, which will con sist of hollow cast iron, of 1½ inches thickness, of metal, to be 18 inche deep at centre, 12 inches deep at ends, by 12 inches wide; two of thes to be tied together at the ends; the whole to be supported by eig wrought iron columns 5½ inches diameter, columns to stand at same ang

with cylinder pillow block, caps of wrought iron, brasses of composition, fitted with Babbit's metal.

Eccentrics.—To be of cast iron in two pieces, to admit of being taken off at pleasure.

Eccentric Straps.—To be of composition, with rods of wrought iron, all to be polished bright.

Pistons.—To be of cast iron, provided with two tiers of metalic packing, accurately grooved together, and turned to fit the cylinder, steam-tight, to have adjustible cast steel springs to act upon the packing.

Piston Rods.—To be of malleable iron of best quality, not less than 6 3-4 inches diameter.

Cranks.—To be of malleable iron, polished bright, to be of 3 feet from centre to centre, to have an area of not less than 112 square inches in the plane of centre of shaft, and not less than 48 square inches in plane of crank eye.

Crank Pins.—To be of best malleable iron, not less than eight inches diameter.

Drag Link.—To be of best malleable, with cast iron brasses, and suitable wrought iron keys, all polished bright.

Paddle Shafts.—To be of best malleable iron, not less than 13½ inches diameter in the journal; to have the cranks properly shrunk on to their respective parts, with suitable collars to prevent the end play; to be turned throughout.

Paddle Wheels..—To be of best malleable iron, to consist of three sets of arms, each set to be connected by two sets of rings, all properly rivetted together; and fitted into cast iron centres of not less than 7½ feet diameter, each of which is to be keyed to the shafts by eight well fitted wrought iron keys; arms to be 5 inches by 1 inch where they emerge from the cast iron centre, and 3½ inches by 5-8 inch at outer rims; rims on outside of buckets to be four inches by 5-8 inch; rim inside the buckets the same; wheels to be about thirty feet diameter and six feet space, to be well braced with diagonal braces, 1½ inches diameter.

Steam and Exhaust Valves..—To be of the common balance puppet variety, valves and seats of composition; connection between valves of cast iron, with cast steel stems 1½ inches diameter; steam valves to be of 9 3-8 and 8 5-8 inches diameter; exhaust valves to be 10½ and 9 3-8 inches diameter.

Valve Motion.—To have a rock shaft of not less than 3½ inches diameter, of malleable iron, the arrangements of eccentries, &c., [illegible] such that the engines can be hooked on when backing, and to wo[illegible] ex-

pansively by retaining the steam valve to its seat; the rate of expansi to be adjustable when the engines are in motion.

Starting Gear.—To be made convenient for one man to work with e gines at once, with throttle and injection valves under his control at t same time.

Throttle and Snifting Valves..—To have one to each engine, of comp sition, and composition seats.

Injection Valves.—Outward to consist of two screw valves 7 inches ameter, valves, seats and stems of composition, to be connected by a bran pipe, valves or condensers 5 inches diameter, of composition; valves, se and stems with finished cast iron hand wheels, pipes to be of copper.

Bilge Injection Valves..—One to each condenser, five inches diamet valves, seats and stems of composition, with furnished cast iron ha wheels in a convenient position, in the engine-room, to have suital pipes and strainers of copper.

Steam Pipes.—To be of copper, 3-16 inch thick, 12 inches diameter, o to each engine; if the two are combined during any part of their leng the large part to be 17 inches diameter, ¼ inch thick, to have suitable a pliances to prevent expansion and contraction.

Side Delivery Valves.—To be of composition, with composition seat valves to be faced with rubber, to be 15 inches diameter in the clear; pi of copper ¼ inch thick.

Holes Through Ship.—To be lined with copper, and where current c water is, to have suitable strainers of composition; and in all cases whe they are below deep load water line, to have either a stop valve or coc immediately at the opening on the inside.

Bearings.—All to be fitted with composition brasses, filled in with Bal bitt metal when required.

Oil Cup.—To all journals that require therein, those on the mainshaft crank pins and trunions, to be of the best forms yet devised for keepin those parts constantly lubricated.

Pipes.—All steam and water pipes not otherwise specified, to be of th copper of suitable thickness, with composition flanges and belts interjointe together.

Trunions.—To be not less than 20 inches diameter in journal, to hav composition sleeves and glands, and to be packed with hemp.

Bolts and Nuts.—All the bolt-heads and nuts to be dressed true an equal throughout; the engines for the same size bolts.

Foundation Bolts.—Of galvanized malleable iron, to extend throug

the keelsons, and efficiently secured on the under side of the keelsons by nuts and washers.

Floors, Galleries and Ladders.—To be of cast iron, 3-8 inch thick in thinnest parts, to be conveniently arranged to give access to all parts of engines that require attendance, when in motion, with brass hand rails supported by wrought iron stanchions, turned and polished.

Hoisting Engines.—Two vertical noncondensing engines, with cylinders about eight inches diameter, by twelve inches stroke, connected at right angles to gearing for hoisting coal, weighing anchors, hoisting ashes and other light weights. The velocity of the periphery of sending barrels, to be so graded that when the engines are making 100 revolutions per minute, there may be a choice of 400, 200, 100, or 50 feet per minute, everything so arranged that one man may stop and start the engines and manage the reels on deck; speaking tube to connect between this position and fire-room if necessary to convenience for hoisting ashes. Engines to be connected by suitable pipes, valves and cocks to small boiler.

Steam Pumps.—One to have a plunger of six inches diameter, by twelve inches stroke, with steam cylinder, having four times the capacity of the pump, having suction connections with the Bilge, each of the boilers the sea, and with flexible suction hose, to enable it to draw from the bilge of another ship, to have discharge connections with each of the boilers, the sea and with fire hose.

Also, one of small size, suitable for feeding small boiler from the sea, and to have no other connexions.

Fire Hose.—To be of gum, and of sufficient length to reach from the pump to each end of the ship, and at the same time to have two pipes of $1\frac{1}{2}$ inch nozzle, and two of 1 inch nozzle.

Appendages to Engines:—

2 Indicators, connected with cylinders.

1 Clock, one Register, 1 Steam Guage.

2 Vacuum Guages, 2 Thermometers.

1 Engine-room, thermometer brass or copper, drip-pans for each journal that requires them.

1 Oil Trunk, to contain 200 gallons.

1 Tallow Trunk, to contain 300 pounds.

List of Tools:—

1 Five gallon Copper Oil Trunk.

1 Gallon Copper Measure.

1 Quart " "

4 Brass or Copper Oil Cans.

2 Copper Tallow Kettles.
2 Brass or Copper Lamp Fillers.
6 Clipping Hammers, Cast Steel.
12 Cast Steel Chipping Chisels.
1 Vice, with Bench.
2 Pairs Steel Pointed Compasses.
2 pairs Callipers.
2 Steel Squares.
2 Drill Braces and assorted Drills, from 3-8 inch to 1½ inches.

Coal Bunkers, as per plan; the lower course of 5-16 inch iron, and th remaining portion of ¼ inch iron, to be braced sufficiently to resist th pressure athwart ships; bulkheads to be of same thickness of iron wit valves in bilge connected with coal bunkers; there shall be a sufficier number of doors, deck-plates and pipes.

Spare Machinery, to be furnished if required.

1 Piston, complete, 1 Piston Rod, 1 Cylinder Cover.
1 Air Pump Cover and Piston or Bucket, with valves.
1 Set Valves for Feed Pumps.
1 Eccentric, complete.
1 Crank and 1 Lot of Bolts and Nuts for one engine.
1 Set of Brasses for Bearings for one engine.

½ Ton Boiler Plates, 100 different Bolts and Nuts for Boilers, &c.; 2 Bars of Iron for Braces in Boilers.

200 Boiler Rivets; 1 set Grate Bars; ½ dozen Copper Elbows, for di ferent sized Pipes.

Solder for one set of Pipes; 3 Glass Water Guages; 1 Steam Guage; Vacuum Guage; 20 lbs. Mercury; 1 Hole Door; 1 Furnace Door; Spar Tools for working Boilers.

1 Set Stocks and Dies, from 3-8 to 7-8 inches diameter.

1 Set Stocks and Dies, from 1 to 1½ inches diameter. 2 Centre Punches. Screw Punches. 2 Pall do., 1 small, 1 large. 1 S. Wrench, for 3-8 inc and ½ inch bolt nuts. 1 do. do. do., 5-8 do. 3-4 do. 1 do. do. do. 7-8 do 1 do; 1 do. do. do. 1¼ do., 1½ do. 1 large and small key wrench; 3 mai pillow block nut wrenches—1 heavy, 1 very light; 1 box; 2 Trunio pillow block binder nut wrenches—1 heavy, 1 very light. 2 wrenche for holding down bolts—1 open and 1 box. 2 hook wrenches for paddl bolts. 2 light wrenches for valve stem adjusting nuts, at least one wrenc besides screw wrenches, that will work conveniently, each nut about th engines or boilers not specified. 1 smith's forge and anvil, with complet set of tools, such as are required on board steam ships. 1 hydraulic and screw jack; 1 drill Crabb; 1 grind stone, box and fixtures; 6 boiler pick 3 reemers, 3 corking tools; 2 rivetting hammers, 2 coal breakers; 6 co

shovels, 2 pairs iron blocks for raising cylinder covers, &c., 1 dozen assorted files; 2 iron ladles, 2 pairs shears—1 large and 1 small; 1 set expanding tools for boiler tubes, complete.

GREAT REPUBLIC.

THE following letter from Lieut. Maury, to the Hon. Secretary of the Navy, with the sbstract log of the clipper ship Great Rspublic, will be read with interest by nautical men.

U. S. N. Observatory & Hydrographical Office,
Washington, April 18, 1857.

SIR:—The abstract log of the Great Republic, from New-York to San Francisco, has been received at this office. I am indebted for it to Montgomery Parker, the first officer of the ship. It is instructive as well as suggestive, and perhaps you will find in the circumstances connected with it matters of interest sufficient to justify a special report.

The Great Ropublic is the largest merchantman, I believe, that has ever, unaided by steam, crossed the sea. Furnished with a set of the wind and current charts, she sailed for California, bound from New-York, on the 7th of December last, and on the 23d of that month, being, according to the journalist, "fifteen days and nineteen hours from Sandy Hook," she crossed the equator in longitude 34° 50′ west—thus making the shortest run of which this office has any record.

For a vessel bound to Rio, or the Pacific, to have taken the route that ship followed, and to have crossed the equator where she did, would have been considered, a few years ago, as against all rule; yet such are the improvements in navigation and shipbuilding, that she not only passed without difficulty all the "bug-bear currents" of St. Roque, but found herself on Cape Horn within the limits of the time which, by the old route, was considered as a fair passage from New-York to the equator.

Soon after this plan of embodying the experience of many navigators as to the winds and currents to be encountered on this or that voyage, according to the different seasons of the year, was first begun, the opinion was expressed, but pronounced visionary, that with such lights to guide, the passage to the line could be made under canvass alone in sixteen days. The usual time then was forty days; it is now thirty.

In 1807 the English fleet of transports, with troops for the La Plata, fe"

to leeward of St. Roque, and in dread of its currents put back twice in the northern hemisphere, encountering many difficulties.

Because of this and other circumstances, Cape St. Roque was regarded as another Scylla; and from that day, and without further inquiry, the directories of the sea have continued to warn navigators against the offing of this headland as most dangerous.

A vessel crossing the line to the west of 20 or 25° west was, these directories held, almost sure to be "horsed to leeward" by these St. Roque currents, and wrecked or hopelessly "back-strapped." But writers in repeating this caution forget that the average speed of English merchantmen in 1797 did not exceed two or three knots an hour, and that a current which it was impossible for them to beat against would scarcely be felt by a modern clipper, as in the pride of her beauty, and in the strength of her prowess she reels off twelve knots or more upon a bowline.

Moreover, when I came to examine log books and ascertain what vessels had encountered these "dangerous" currents, when and where, I discovered them to be a bugbear, and so variable as many times either not to be felt at all, or if felt, favorably felt. And as an illustration of the facility with which a long-legged and swift-footed ship may walk to windward of St. Roque, I subjoin extracts from the Great Republic's log.

Dec. 22, 1856—Lat. 3.04 N., long. 33.02 W., barometer 29.74; temperature of air 84; of water 82; wind S.E. by S. Throughout these 24 hours moderate S.E. trades and generally fine weather, with a squall of wind and rain at 3 P.M. At meridian we are in 0.5 N., and with this breeze shall cross the line in about half an hour, making the passage from Sandy Hook in 15 days and 19 hours, believed to be the shortest passage on record. We are, however, in an awful tight place as regards our longitude, and must run for luck and Maury.

Dec. 23—Lat. 0.05 N., lon. 34.52 W., barometer 29.83; temperature of air 84; of water 82; wind S.E. First part light S.E by S. winds, and fine weather. At 4 P. M. tacked ship to the eastward. Middle part moderate winds and fine. At 4 A. M., tacked to the southward. Ends with good breezes and fine weather, and we have got to make a beat of it.

Dec. 24—Lat 0.42 S., long. 34.49 W., barometer 29.80; temperature of air 85; of water, 81; wind S.E. Throughout these 24 hours experienced good trade winds and generally fine weather; the wind veers and hauls a couple of points, and the current is comparatively small. We shall see now, how the plan works to beat to windward here instead of further north. At noon no land in sight, horizon quite hazy.

Dec. 25.—Lat. 4.25 S., long. 35.40 W., barometer 39.85; temperature of air, 85; of water, 80. wind S.E. First part, fresh trades and pleasant at 3, P.M., made the land and tacked ship; middle part, moderate wind

and fine weather; at 11 P. M. tacked; latter part light winds and variable from E.S.E. to S.E.; tacked ship at 10 A. M., and at meridian.

Dec. 26.—Lat. 4.59 S., long. 35.14 W.; barometer 29.93; temperature of air, 84; of water, 82; wind S.E.; first part, light winds and fine weather; at 2, P. M., made the land on the lee bow, and tacked the ship to E.N.E.; at 7, P. M., a squall of wind and rain; middle part, good breezes and fine weather; at midnight tacked to S. by W.; at 7, A. M. passed the latitude of Cape St. Roque in 19 days and 14 hours from Sandy Hook, notwithstanding we have had to beat two days with light winds. Another feather in Maury's cap.

Dec. 27.—Lat. 6.02 S., long. 34.32 W., barometer 29.88; temperature of air, 83; of water, 80; wind S.E. by E.; first part, light winds and pleasant hot weather; land in sight on starboard bow; at 6, P. M., tacked ship to eastward. * * * * * * *

This vessel did not have the luck to get a wind that could keep her up to her mettle for twenty-four hours consecutively. Here and there she got into favorable streaks of wind, but she appears to have run out of them faster than they could follow. She made the run to San Francisco in 92 days.

The shortest passage that, in the present state of ship-building will probably be ever made from New-York to San Francisco, is 85 days; and the very clever first officer of this ship, writing from California, expresses the opinion that, "should she continue to run between New-York and San Francisco, from the experience of this voyage, she will one day make the trip within your possible 85 days."

The friends of this noble specimen of naval architecture, however, can scarcely hope for a fair trial and proper display of her prowess until she shall be sent on a voyage to Australia. The brave "west winds" of the Southern hemisphere, which she will then encounter, will enable her to show herself; elsewhere, she can scarcely find a sea wide enough, with belts of wind broad enough for the full display of all her qualities and capabilities. Respectfully, &c.,

M. F. Maury, Lieut. U. S. Navy.

Hon. Isaac Toucey, Secretary of the Navy.

Chloroform in Sea Sickness.—Dr. Lander, of Athens, states that from ten to twelve drops of chloroform, in a little water, is an unfailing remedy in sea sickness. One dose has been known to give immediate relief.— *Lancet.*

WHICH IS THE BEST MATERIAL FOR SHIPBUILDING—WOOD OR IRON?

THE equilibrium of the public mind has been somewhat disturbed o the subject of marine construction, owing in some measure to the depre sive state of trade, but chiefly to the boisterous effusions of interested pa ties, whose ends are gained when they can throw doubt upon the feasibilit of constructing wooden vessels for screw propulsion. But the mo amusing part of this farcical movement on the part of these dealers i iron, is the fact that they actually deny the practicability of securing th shaft bearing in the stern-post of a wooden vessel, when in truth ou screw vessels, next to England's, are the most numerous on the globe, an nine-tenths of them are built of wood, and it is well-known that they ar quite as fast, and not less secure from vibration in their journals than thos of England. Indeed, so far from the security of shaft journals bein problematic in wooden vessels, they have been found to be peculiarly s in iron vessels. Because we have an abundance of iron, as well as woo shall we do as our transatlantic friends do, who act from necessity. W see no reason why we should set fire to or destroy our forests of the fine timber in the world in order that rival nations may possess equal adva tages with ourselves. While France and other governments are receivin supplies of timber for shipbuilding from the United States, English infl ence is endeavoring to destroy the value of our forests, and to increase th value of her mines. The mask is too flimsy to hide the horns of Joh Bull. Just at a time when the merchants and ship-builders of the Unite States are preparing to improve the quality, capacity, and durability o wooden vessels, by increasing the length and strength of the several par of the frame, and by giving form to the frame by bending the timbers i stead of blocking them out with the axe—these interested men of th mine take the alarm and cry out iron instead of wood. How very signi cant! Would the friends of iron increase the ballance of trade against th United States? Is not the fact that English capital builds wooden shi in the colonies, because of the limited supply of timber in the Unite Kingdom, sufficient to satisfy the commercial mind of the utility of ir construction. If England had the timber at home in equal proportion an at the same cost as iron, who doubts that she would build wooden vesse instead of iron—and why? Because those who have tested both wood an iron for ship-building, know wood to be the best, with a suitable mixtu of iron, and ourselves among the number. A vessel entirely of wood an absurdity—so, also, we say of iron—but let each be put in its prop place, and then we have the adaptation designed, which is that a prop combination of both should tend to improve the fabric. As the ship ca

not navigate a single element—the ocean, without the aid of air, so also, both the vegetable and mineral kingdoms must contribute to the construction of this, the noblest work of science and art. In reference to iron vessels, we say to these men of the mine on the other side of the Atlantic and to their agents on this side, that the English ship-building iron is unfit for building vessels. *We know this from personal experience*, and when the time comes, if it ever should, that our timber supply is too small for the demands of commerce, we shall be able to find, to say the least of it, as good iron as the United Kingdom can furnish, in the United States. But to the reasons why wood is better than iron for ship-building.

First, we say that the same reasons which keep iron ships out of the Navy should keep them out of the mercantile marine: they are more easily ruptured, and when ruptured it is much more difficult to repair the breach. Second, they are single-shelled, as very generally built, while the wooden vessels are all double-shelled, and consequently safer. A great many wooden vessels have been found at sea water-logged and the passengers taken off, but when the iron vessel fills she goes down, unless her cargo is sufficiently buoyant to keep her up. There are a great many persons who cross the Atlantic who know this, and will not, under any circumstances, take passage in an iron vessel. But wooden vessels, being more elastic, are capable of yielding to the strain more than iron vessels possessing an equal amount of strength. This, to the iron vessel is positively dangerous. When the strain is too great for the fabric, the rupture is sudden and gives no warning. The wooden vessel gives timely notice—witness the case of the Persia, one of the Cunard mail steamers: a rupture took place in her bottom, and it was found necessary to keep her engines at work after she had arrived in port, until she could be docked in order to keep her from sinking. The difficulty with iron steam propellers is not known to our maritime men on this side of the Atlantic, nor are our transatlantic friends anxious to exhibit them, but on the other hand they very carefully conceal them. In reference to the security of the shaft in the stern post, we do not hesitate to say, and understandingly we think, that we can furnish greater security to the propeller shaft in a wooden vessel than our transatlantic friends can in an iron vessel as now built. We have heard much said, of late, about the insecurity of propeller shafts in wooden vessels, but it invariably came from those who know nothing about steam vessels or screw propellers, of their own personal knowledge, but having learned to tell their story from the lips of another, keep on repeating it until they have learned the lesson so well that they begin to think their story is true, or at least founded on fact. Now the only trouble there is in scre[illegible] propellers, in wooden vessels, lies in the large surface of the after sid[illegible] he stern post, which causes the jar felt on the stern, and impedes the [illegible]s

of the vessel. It is one of the easiest things imaginable in mechanical op-erations to obviate this, by putting a break-water on the after edge of tl post, just as the gripe is put on the front of the stem. Wood is peculiarl adapted to maritime construction—first, because of its buoyancy—secon because of its elasticity. It requires but a moment's reflection to discov that the great Architect of nature never designed these giants of tl forest to be wasted by being split up into barrel staves and a thousar other things which would serve a much better purpose if made of ir Experience has shown that water is kept in a more wholesome state iron than in wooden tanks—so, also, of sea-biscuit for long voyages. O transatlantic friends have been first to discover this: hence, we say, l the ship be built of wood, and let that wood be so improved, both f strength and durability, that the greatest amount of strength shall be s cured with the least amount of weight, so far as the wood is concerne then let there be a larger admixture of iron, in strapping the frame; b the quality of the iron must also be attended to; English iron is not goo enough for such purpose. We have had too many samples of this mat rial not to be well-posted; the best one, we feel assured, may be seen o board the steam-frigate Niagara. But flat iron is not suitable for stra ping vessels, and can only be used on the inside; the reasons are obviou the flat bar shuts out fastening—whether put on the inside or outside o the frame, and in a war vessel it is positively dangerous. If a shot shoul strike one of the iron plates, say the plate was only of the ordinary size, would make sad havoc by bursting everything asunder in the vicinit Whereas, if the strap was of round iron and on the outside, the shot woul cut off the roll, without doing material damage. In addition to this, th fastening may be properly distributed in the case of the rods, whereas, i the case of the broad plates it cannot be so arranged. So, also, with re gard to the keelson: it may be used for water tank, bread locker, an ventilator, with the greatest economy; and as for longitudinal strength, proportionate amount in large vessels cannot be secured without it. It i next to the model, in the proper admixture and proportions of the materi of construction, that success depends in navigating the ocean.

MAMMOTH BARGE.—There is quite a rage for huge barges. The Samu J. Holly is the largest yet built; she is 135 feet long by 35 feet wide, an has ample room for stowing 7,000 bbls. of flour, which is 1,000 bbl above the capacity of any previously built. She is named after a larg shipper of wheat in Oswego, and cost $15,000.

ESSAYS ON THE LAW OF SHIPPING.

BY WILLIAM W. BADGER.

No. 2.—The Law of Freight, and the Shipper's Lien on the Ship for Damages.

I.—*The Law of Freight.*

The contract of affreightment is, in its nature, an entire contract, and unless it be fully performed by a delivery of the goods at the destined port, no freight will be earned.

This is the general rule, and we know of but three exceptions to it.

If the shipper or the consignee voluntarily accept the goods at some other place than the port of destination, he becomes of course, liable to pay the freight due on them at the time of such acceptance, which will be an amount proportioned to the amount of the original voyage which has been performed.

So, if the goods laden be thrown overboard for the safety of the ship, or be lost by any peril of the sea, *in a manner to make them the subject of general average*, the freight, or at least a *pro rata* freight will be earned; although, as a general rule, a loss of the goods by a peril of the sea will prevent the recovery of freight.

So, if the goods be taken from a neutral or innocent carrier in time of war, by a justifiable and legal capture, a *pro rata* freight will be due to the shipowner.

With these three exceptions, the cargo must be delivered at the port mentioned in the contract of affreightment, and substantially according to the terms of that contract, or no freight can be recovered.

If the contract be for a specific sum for the whole voyage, outward and homeward, the specified sum will be due, though the shipper fail to furnish any homeward cargo. But in this case the ship-owner is not at liberty to return with his vessel empty, if he can easily find a cargo which would pay him the return freight. So, if the contract be for the entire ship, or for a specified sum for every ton, or other portion of the ship's capacity, the payment must be made for the full burden of the ship, without regard to the amount actually laden and carried. But the master is not at liberty to sail with part of a cargo, and to charge the full freight therefor, if he be offered a satisfactory cargo for the balance of room which he may have, by other parties.

Although it may be impossible to deliver the cargo at the destined p according to the contract of affreightment, and that without any faul

neglect of the shipowner, as by a blockade of the port of discharge, or an interdiction of commerce after the voyage is begun, by declaration of war or otherwise, and the cargo be safely carried to the very entrance of the destined port, yet no freight can be recovered *on the contract*, though probably a *quantum meruit* would be allowed in some other form of action.

So, if a ship lose part of her cargo by a peril of the sea, and deliver the remainder safely at the port of destination, no freight will be earned in law, though probably a *quantum meruit* would be allowed by the courts.

If the ship be delayed by embargo during the voyage, or in the port of departure, or by any other merely temporary restraint, as for necessary repairs, the master may detain the cargo until he is able to prosecute the voyage, or until the shipper tenders him the full freight, unless the cargo be of a nature that will not endure the delay, as perishable fruits, grains, &c.

If the cargo, by its own intrinsic decay, or by peril of the sea, or by effect of change of climate, become greatly deteriorated, or worthless, during the voyage, it has been much questioned whether any freight can be recovered on it, and whether the owner may not abandon and leave it to pay its own freight; and it is somewhat remarkable that the two most distinguished jurists of France, Valin and Pothier, held directly opposite opinions upon this question; Valin contending that the cargo must be carried safely and in good condition, at all events, to earn freight; and Pothier, that the shipowner should only be held responsible for due diligence, and should by no means be made an insurer of the good condition of the cargo against circumstances entirely beyond his control.

The opinion of Pothier has finally prevailed in France, (*Code de Commerce*, 305, 310) and is now doubtless the law in nearly every port of the civilized world. Chancellor Kent adopts it as expressing the American Admiralty law, and remarks that, "the carrier is no more an insurer of the soundness of the cargo against such perils, than he is of the price in the market to which it is carried."

It is now fully settled that if the cargo *be carried*, though it be a mass of corruption, and entirely worthless at the time of its arrival, the whole freight is earned unless there has been negligence in taking proper care of the cargo on the part of the shipowner. And it will depend very much on the circumstances of each particular case, as to what facts will constitute negligence; the general rule being that the shipowner will be held to the strictest diligence in the care and preservation of the property entrusted so absolutely to his charge.

So, if casks of wine or other liquors being well stowed arrive empty, on account of leakage or inherent waste, the full freight will be due; but if the loss arise from any defect in the stowage, or by a peril of the sea, by which the contents are washed out and wasted, by the breaking or strain-

ing of the casks, no freight can be recovered unless it be from the insurers.

No freight will be due if the voyage be broken up before the ship has left her wharf, though she may have been fully laden; and if freight in such case has been paid in advance, and was not designed as an unconditional payment, it may be recovered back.

If the goods be voluntarily accepted by the shipper at an intermediate port, or at any other than the port of discharge, a *pro rata* freight will be due, proportioned to the amount of the voyage which has been accomplished; but not if they are accepted from mere necessity, to preserve them from entire loss, as in cases of shipwreck or abandonment; and in such cases, the acceptance of the cargo at any place, if under protest against freight, will raise no implication of an agreement to pay the freight.

In the calculation of *pro rata* freight in such cases, the amount of the voyage accomplished must be considered commercially, and not geographically; that is, the shipowner must be allowed the freight for the whole voyage, after deducting therefrom the expense of transporting the cargo from the port of acceptance to the port of its destination. Mere distance in such a calculation is of but little consequence, as the vessel may have accomplished nine tenths of the voyage in distance, and perhaps not half of it in value, inasmuch as the expense of accomplishing the remaining tenth may be, on account of the scarcity of vessels, or of increased rates of freight, actually greater than the expense of all which has been accomplished.

For these reasons the old English rule of calculating *pro rata* freight according to the distance of the voyage accomplished, has been abolished in America, and our courts will only look at the voyage in a pecuniary point of view.

II.—*The Shipper's Lien on the Ship for Damages or Loss by the Neglect of the Shipowner, or by the insufficiency of the Vessel.*

By the Marine Law the ship and the freight are bound *in specie*, or pledged to the cargo for the faithful performance of every contract made by the shipowner, or by the master, within the scope of his authority.

In the old Roman law the ship was bound for all acts of the master, whether arising within the scope of his authority or not, and whether growing out of contract or negligence, breach of contract or positive fraud, *ex contractu* or *ex delicto*, on the ground that the shipowner should not give control of his vessels, except to those for whose acts he was willing to be entirely responsible. But the spirit of our modern codes is more liberal, and we hold no man responsible for the frauds of another except

so far as they become his own acts by his delegation of power, and the ship, therefore, cannot be bound by any act of the master which is entirely beyond his authority.

The shipper's lien on the ship is usually treated in connection with the shipowner's lien on the cargo, and is the reciprocal of that lien, or the consideration for it. Cleirac mentions them together as mutual obligations in the often-quoted sentence from the *Jugemens D'Oleron*,—"*Le batel est oblige a la marchandise, et la marchandise au batel.*"

It differs, however, from that lien, in not being at all dependent on possession, and although the ship may have passed through the hands of a dozen innocent purchasers, the lien will still attach to it if it had accrued before the sale.

It is the *privilegium* of the civil law, a *jus* in *re*, a right in the thing which is inchoate from the moment the loss or damage occurs, and when carried into effect by a proceeding *in rem* against the ship, it relates back to the period when it first attached.

It is not, however, entirely indelible, and may be lost by unreasonable negligence or delay; but if the proceedings to enforce it be undertaken in good faith and with ordinary diligence, the lien may be enforced against the ship into whosoever possession it may have come.

The existence of this lien is as well established as any principle of the maratime law; it is admitted in all the English text books; it exists as a legend in all their charter parties; it is enforced in all other foreign ports and yet, with a strange inconsistency, the English courts have never practically acknowledged it, and no proceeding is known to those courts to this day to enforce it. In the language of Judge Ware, "they have held out the right but held back the remedy, giving the word of promise to the ear and breaking it to the hope."

It remained for the American Admiralty in this as in many other questions, to take the initiative step in creating and developing a *practice* which embodies and justly carries out the principles which have been so long recognised; and in doing this our judges have merely looked beyond the English courts, and restored the earlier and rightful admiralty jurisdiction and process.

That this lien existed, and was enforced by the process *in rem* as early as the middle ages, appears from several passages of the civil law, and sufficiently for our purpose, from the following passages of "*Il Consolato del Mare*," the most venerable of all the maratime codes. Chapter 58 of that work lays down the rule that the shipowner is responsible for all loss or damage occurring to the goods while they are in his charge, which arises from his fault; and chapter 63 enforces this responsibility, in case the shipowner be unable to pay such loss or damage, by a proceeding to

sell the ship, allowing no claim but seamens' wages to take precedence of the shipper's demand.

The same provisions are contained in subsequent codes, but in the *Ordonnance de la Marine*, compiled in the sixteenth century, we find the important modification that the shipowner can only be held responsible for such loss or damage to the extent of the value of the ship and freight, and may be discharged from such responsibility by abandoning to the shipper the vessel and all claims for freight; and even then the shipper's lien is placed in the fourth rank of privileged claims—thus making it in many cases entirely worthless.

But Emerigon in commenting on those provisions in his *Contrats a la Grosse*, lays down a different rule, and we think wisely remarks as follows:—

"It seems that the privilege of those whose merchandise has been lost or averaged by any other cause than the dangers of the sea, ought to be placed in the *first* rank—even before the seaman—since such losses and damage often proceed from the act of the crew; and it would be still more equitable to give the merchant shippers preference over those who have loaned money on the ship before her departure, because the shippers are ignorant of the supplies and loans which may have been made in the place of outfit."

The modern code of France in aiming to carry out the spirit of this opinion of Emerigon, goes to the other extreme, and does away with all rank in privileged claims, or places them all in the first rank, by giving them a concurrent lien (*viendront en concurrence*) on the vessel, and in case of insufficiency of value to satisfy them all, the price of the vessel sold at auction, is to be divided among them proportionally to the amount of each.

In England the shipper's lien ranks low in the order of privilege, and the last editor of Lord Tenterden's excellent work on shipping, places ten distinct claims before it, and remarks that "most of them are justly preferred to it."

We are not aware that the rank of this lien has ever been judicially determined in America; but it seems to us there is great weight in the reasoning of Emerigon quoted above, and we cannot but believe that the American courts will in this particular, as they have in so many others, look beyond the jurisprudence of England, and restore the ancient and rightful application of the maratime law, by placing this lien among the most favored claims, and allowing nothing, unless it be seaman's wages, to take precedence of it.

The limitation of the owner's responsibility to the value of [illegible] and

freight has been adopted into most of the maratime codes of Europe, and was finally settled in England by statute in 1813.

Similar statutes have been passed in several of the United States, as in Massachusetts in 1818, re-enacted in 1835, and in Maine in 1821, and where these statutes exist, they seem to have assimilated the common and the maratime law, so that the rights of parties are the same under either jurisdiction; but where such statutes have not been passed, and the European maratime rule has not been adopted in judicial decisions, we apprehend the common law would prevail and the shipowner be held responsible for the full amount of the loss or damage, whatever it might be, without any reference to the value of the ship or freight.

The right of lien against the ship itself *in specie*, doubtless originated in this limitation of the owner's responsibility, it being founded on the supposition that the thing itself is the best representative of its value.

In the English law, where as we have remarked this claim cannot be enforced as a lien, there being no process *in rem* allowed for its enforcement and where the shipper is obliged to resort to an action at law to recover his damages, the value of the ship at the time the loss or damage occurred, is appraised when it arrives at the port of discharge, by appraisers appointed by the court, and its value thus determined—while the freight lists of the voyage are taken as evidence of the amount of the freight, the whole freight being included as the measure of the owner's liability, though if it have been diminished by jettison or other average losses, the amount after such diminution only is included.

In this country the process *in rem* may issue at once against the ship, her apparel and furniture, and freight, for all loss or damage of the cargo, unless it arise from its own intrinsic decay, or from the ordinary excepted perils of the sea; and nothing will excuse the owner from this liability but the *vis major, quod damno fatali contingit cuivis diligentissimo possit contingere.*

It is an implied warranty in the contract of affreightment, that the ship shall be sufficient and seaworthy for the sort of cargo and the particular kind of service for which she is engaged, and if the goods laden are lost or damaged by any defect of the vessel, whether latent or visible, known or unknown, or by any default or negligence of the shipowner, his master and crew, which the strictest diligence could have prevented, the shipowner must be held to answer for such loss or damage.

If goods are stowed on deck without the consent of the shipper, or the sanction of custom; or if the master neglect to take a pilot when it is customary to take one, the owner is responsible for all damage which occurs on account of such neglect, although it may arise from what would otherwise be an excepted peril of the sea. The owner is also responsible for

all acts of the master, whether *ex contractu* or *ex delicta*, and even for his torts when committed within the scope of his employment as master, and is therefore held to the strictest faithfulness in all his appointments concerning the vessel.

10 Wall street, New York, July 28, 1857.

CLARK'S SAUCER DOCKS FOR SHIPS.

A correspondent of the London *Mechanics' Magazine* writes thus:—

An effective method of repairing ships, many of which are now built of such lengths as to set aside the use of the old docks, is a world-wide want. Will the Victoria Dock scheme at Blackwall meet this?

The lifting part of Mr. Clark's apparatus is simply the principle of Evans's Hydrostatic Dock, patented at New-York in 1831. (See "Weale's Quarterly Papers on Engineering, Lady-day, 1845, Part 7.") The Patent for England was bought by Mr. Pitcher, then Secretary of the Royal Mail Company, who had elaborate working models sent over; but, not answering in America, it made no way here. Its defects arose from the flexibility of a ship, rendering it dangerous to lift her by so many unconnected applications of power; and if this was found to be the case with common ships, with clean swept holds, much more would it be so with steamers thrice the length, and with the great and concentrated weight of engines, &c., *in a fabric as flexible as a wagoner's whip*, where if, under this central pressure, any of those nervous and delicate hydraulics refused to act, deflection would take place unobserved for some time. Evans's plan seems preferable in detail, as all the vertical or lifting chains are connected with one vertical chain drawn by one hydraulic apparatus on each dock side, whereas, this of Mr. Clark's has forty hydraulics.

The next defect arose from the impossibility of effective shoring; none could be applied to the sides as the ship was lifted, and no means of properly supporting the bilge were provided. Mr. Clark says this can be done when the ship is up, and in the daylight; but what of the twilight, while the ship is unsupported? and no ship is self-supporting. They are emphatically a "bundle of bits," because of the short shift of their timbers, and with the enormous weight of engines, &c., pressing, b[illegible] embered, upon an inverted arch, what is to prevent great straining

The experience gained in thus raising the tubular brid[illegible] nothing. Those tubes were self-sustaining, and [illegible] ffort is si[illegible] vergome dead weight—a matter simple enoug[illegible] ocking [illegible] with

their multiplicity of joints and connections easily deranged, is a vastly different thing.

Another objection is to floating docks *in toto.* At Marseilles, when I passed, the large floating dock was unused, while four ships were hove down around her. Upon minute inquiry, I found that the mere undulation of the harbor caused the large surface to twist sufficiently to drive the cleats from the shore-heads, and that in rough weather it was dangerous.

The floating docks once at Portsmouth and Southampton confirmed this

It may well be asked if the "saucer" (clever term) that is to carry the ship is to be 7 or 8 feet deep, why not make it sufficient for the draught o water, and pump it out—a matter, when the ship has displaced her bull of water, of little effort—and thus do away with the expense and dange of so many hydraulics?

The discussion of this matter may tend to mature an important project or prevent futile speculation where serious outlay is a necessary concomitant.

LOG OF STEAMSHIP VANDERBILT.

Cowes, 10 o'clock, A. M., June 30, 1857.

The new American steamship *Vanderbilt*, D. H. Wilcox, Esq., commanding, from New-York on the 20th inst., with 182 passengers and \$850,000 in specie for London and Paris, left her wharf at New-York, at 12 30 P. M., and anchored at Cowes at 10 A. M. this day Time from port to port, 9 days 16½ hours.

Saturday, 20th, at 12 30, cast off from the wharf. At 2 30 discharged pilot.

Sunday, 21st, lat. 41.10, long. (D. R.) 68.14	255	miles.
Monday, 22d, lat 42.09, long. " 61.20	315	"
Tuesday, 23d, lat. 43.48, long. " 54 30	318	"
Wednesday, 24th, lat. 44.36, long. " 47.48	315	"
Thursday, 25th, lat. 45.48, long. (Ob.) 40.41	320	"
Friday, 26th, lat. 46.51. long. " 32.12	326	"
Saturday, 27th, lat. 48.48, long. " 24.04	340	"
Sunday, 28th. lat. 49.05. long. " 16 30	310	"
Monday, 29th, lat. 19.38, long. " 8.30	326	"
Tuesday, 30th, at 10 A. M., anchored at Cowes	317	"
Total	3,142	"

THE ROYAL YACHT.

"The Queen of these realms has, as she should have, the fastest and finest steam yacht in the world. The *Victoria and Albert* was built at Pembroke dockyard, from designs furnished by the Surveyor of the Navy. Her length between perpendiculars is 300 feet, and from taffrail to figure-head 337 feet; her extreme breadth is 40 feet three inches; her burden in tons 2,343. She has engines of 600 nominal H. P., and is propelled by paddle wheels. When tried at the measured mile in Stokes' Bay, with a draught of water of 14 feet aft and 13 feet 10 inches forward, her engines worked up to an indicated H. P. of 2,980, making 25.4 revolutions per minute; and the yacht attained the unparalleled speed of 19½ miles per hour. Her character for unequalled speed was well sustained on a recent trip from the Isle of Wight to Cherbourg, when she accomplished the journey of 84 miles in 4 3-4 hours, having started from the spit buoy at 3 h. 17 m. A. M., and entered the harbor of Cherbourg before 8 A.M., thus making nearly 18 miles per hour. She is built upon the diagonal principle, and is therefore both lighter and stronger than either an ordinary wooden or iron-built ship."

This is moderate speed for so large a vessel of her class. When her Majesty is ready for and desires to attain a higher speed than the *Victoria and Albert* has yet made, let her send her agent with an order across the Atlantic, or with proposals for the construction of a royal yacht, not to exceed 260 feet long, capable of attaining a speed of 20 knots per hour, in moderate weather, and they will be accepted.—Eds. U. S. Naut. Mag.

THE HUNDRED GUINEA CUP OF THE YACHT CLUB.

The following circular has been sent to the Secretaries of the different foreign yacht clubs:

New-York Yacht Club, New-York, U. S., July 20, 1857.

Sir,—I am directed to inform the members of your Association that the One Hundred Guinea Cup, won by the yacht America, at Cowes, England, August 22, 1851, at the Regatta of the Royal Yacht Squadron, as a prize offered to yachts of all nations, has been [illegible] the New-York Yacht Club, subject to the following cond[illegible]

Any organized yacht club, of any foreign country, shall always be entitled, through an one or more of its members, to claim the right of sailing a match for this cup, with an yacht or other vessel of not less than thirty or more than three hundred tons, measured b the custom house rule of the country to which the vessel belongs.

The parties desiring to sail for the cup may make any match with the yacht club in po session of the same that may be determined upon by mutual consent: but in case of dis greement as to terms, the match shall be sailed over the usual course for the annual regatt of the yacht club in possession of the cup, and subject to its rules and sailing regulation the challenging party being bound to give six months' notice in writing, fixing the day the wish to start—this notice to embrace the length, custom house measurement, rig and nan of the vessel.

It is to be distinctly understood that the cup is to be the property of the club, and not o the members thereof, or owners of a vessel winning it in a match, and that the condition keeping it open to be sailed for by yacht clubs of all foreign countries, upon the terms abo laid down, shall forever attach to it, thus making it perpetually a challenge cup for friend competition between foreign countries.

The New-York Yacht Club having accepted the gift, with the cond tions above expressed, consider this a fitting occasion to present the sul ject to the yacht clubs of all nations, and invoke from them a spirite contest for the championship, and trust that it may be the source of co tinued friendly strife between the institutions of this description throug out the world, and therefore request that this communication may b laid before your members at their earliest meeting, and earnestly invite friendly competition for the possession of the prize, tendering to any ger tleman who may favor us with a visit, and who may enter into the contes a liberal, hearty welcome, and the strictest fair play.

Respectfully, your obedient servant, N. Bloodgood,
Sec'y New-York Yacht Club

CHICAGO TO LIVERPOOL DIRECT.

There are two great natural outlets, and only two, by which the grai and other heavy products of the interior of our country may find their wa to tide water. The first is through the Mississippi river, the second throug the St. Lawrence. Through the foresight and sagacity mainly of a singl individual, De Witt Clinton, an artificial channel was constructed a fev years ago connecting the upper lakes with the Hudson, and this, the Eri Canal, has become one of the most important avenues. Although purel artificial for a length of between three hundred and four hundred miles the navigation of the river with which it connects, is so easy that the whol cost of forming by this means a ready transportation from all points o the lakes to this metropolis, has been little, if any, greater than that o

improving the St. Lawrence, and of constructing canals and locks to enable vessels to pass around the Falls of Niagara, and around the various rapids which obstruct that route. Those improvements are now so perfect, however, that vessels of a sufficient size to navigate the stormy Atlantic with tolerable safety can pass through all the locks, and transport goods, without re-shipment, from Lake Michigan to the Mersey. The *Dean Richmond* took a heavy load of grain direct from the wharves at Chicago to the docks at Liverpool, last year, and the details of her log, showing how many days were spent in each lake, how many in being towed through each canal, how many in navigating the lower portion of the river St. Lawrence, and how many on the broad Atlantic, as also the expense attending each portion of the undertaking, has been published in a large number of the leading journals in Great Britain, and in several on this side of the water. The enterprise did not pay, nor can it be made to appear likely that this mode of exporting grain will supersede the present system at any very early day, though it induces all parties to open their eyes to the fact that such an event is possible. A few improvements, perhaps a single one, pointed in some unexpected direction, may turn the scale, and compel New-York to forego all the great trade and wealth derived from the great mass either of the export or import business of the West. Last week a ship, the *Madeira Pet*, was reported as having arrived at Chicago from Liverpool direct, being the first vessel ever sent from England to Chicago. She was laden with a cargo of crockery, hardware, oils, paints, &c., species of goods which are more expensive and destructive to handle than grain, and in the conveyance of which it is consequently more important to adopt such a system. Grain is now taken out of the mammoth lake propellers or sailing vessels, and deposited in canal boats by means of "elevators," with very great facility; and after being towed by horses through the canal to the Albany basin, and by steamers down the river, and across the upper extremity of our harbor to the Atlantic docks, is again unloaded by similar means into warehouses, mills, or large vessels, with no waste, and at an expense almost too small for notice.

We should remark that the outlet for produce *via* the Mississippi, although easier than either of the others, is objectionable on account of the temperature in the southern lattitudes, and that we have left the railroads out of consideration, as they cannot compete in slow heavy freights. The conditions of our country and of the world in respect to production, transportation and consumption, belong properly to both science and political economy, and when a port of entry some two thousand miles from tide water, becomes the point to receive even a "Pet" ship-load of manufactures direct from British wharves, it seems an event worthy of notice by all. Pittsburgh years ago manufactured war steam-

ers for our Navy, and floated them down the river on the spring floods; but ocean navigation to the upper lakes is a quite recent "institution."—*Scientific American.*

NATIONAL UTILITY IN THE NAVY.

THE call of the Bureau of Construction for proposals for the building of a steam sloop of war, is in obedience to the national demands of enlightened members of our government in behalf of light draught of water for the future vessels of our Navy. Preliminary to this call, some of our ships of the line have been razeed into frigates, and our frigates are being raised into sloops of war; the result has been, and will be as we stated years ago, entirely satisfactory. Not only has the draught of water been reduced, but the vessels have more nearly approached the requirements of war vessels, both in speed and sea qualities, and still the demand increases with every new production, until light draught of water has become along our entire coast a positive want of the Navy, in order that our trade may be cared for. But the question is at once raised what is a light draught, or how many feet is a light draught of water? Twenty-five to a ship of the line would be a light draught; twenty feet to a first class frigate of the old stamp, would be a light draught of water, and still the question remains unsettled. The six steam frigates which have just been completed, were set down at twenty-three feet draught, and overrun it with part of their armament on shore, and if these vessels had been as fast as was expected, and in all essentials what the country had a right to expect of them, still they were insufficient, in consequence of their heavy draught of water. A vessel like the English Crimean Gun Boats might escape with impunity, while the six steam frigates lay within range of their spy glasses, without being able to compel a surrender, unless they could do it from their boats; hence their inefficiency, even though they did not exceed the draught intended, viz: twenty-three feet. A whole fleet of vessels might escape up one of our rivers and lay the entire region of surrounding country in ruins, while our steam frigates lay off the month of the river waiting the enemy's leisure, when he would find it convenient to come out and retire along shore. The Mississippi may be thus entered by a fleet, and New-Orleans might thus be destroyed, while our entire Navy could afford no relief. Admiral Napier learned the importance of vessels of light draught of water, during his voyage of "experience" in the Baltic sea during the late war with Russia. England has this class of vessel now, and may we not profit by her experience?

The pressure brought to bear upon Mr. Dobbin, the late Secretary of the Navy, was sufficient to induce him to make an effort to determine what number of feet constituted a light draught of water, the chief of the Bureau of Naval Construction was directed to draw the line of demarkation between heavy and light draught, which in his judgment was consistent with efficient service in a steam sloop of war. The line was drawn and presented to Congress in Secretary Dobbin's report, and was set down in round numbers at 18 feet for a steam sloop of war. It is true this is 5 to 6 feet less than the frigates drew, but it is beyond the mark. We so decided at the time, and have since been called upon by a distinguished member of Congress to furnish a descriptive outline of war vessels, including draught of water. We have done as requested, and have laid before the Hon. Secretary of the Navy the result. For the first class sloop of war, we have set down 14 feet draught; for the second, 12 feet; for the third, 11 feet, and for a brig of war, 9 feet draught. This line of limitation drawn by us, is altogether too fine for the Chief of the Bureau, and the Department seems to have compromised, by drawing the difference: hence the reduction of two feet from the lightest draught of the Bureau for a first class steam sloop of war, and the private shipbuilder's use to be permitted to try first, on the compromised draught before the Bureau of Construction makes a demonstration of its ability to furnish the desired reduction, on those of the steam sloops of war which the Hon. Secretary may decide to build in the Navy Yards. The call of the Bureau in the advertisement for proposals, has more than ever convinced us of the great necessity for a radical change in the construction of our sloops of war, not only the adaptation of their draught of water to the waters of the Continent from whence they emanate, and to which they belong, but to an equalized distribution in equipment and stores. It is a notorious truth that while the ship is provisioned for four or six months, and has other stores for two and three years, such is the inequality of the distribution, that it not unfrequently happens that the two years stores are gone in six months in some departments; while in others, the two years stores would have lasted for five. We can discern no good reason why a war-vessel may not be stored for six months and provisioned for four, and we would be led to doubt the efficiency of that officer, who could not estimate within one-third of the amount of stores required in his own department. Were the allowance book regulated upon this basis, we should not find such strenuous efforts in some departments to obtain more than th[illegible] a[illegible]ance of stores, to the derangement of the allotment of space f[illegible]. There is no more difficulty in carrying other stores, to a [illegible] on a foreign station, than there is in carrying pr[illegible]ions, a[illegible] h[illegible]cribe the increased

efficiency of a ship thus stored, and the comfort afforded to her officers and men?

But the advertisement inviting proposals from private builders, calls for a vessel adapted to things as they now are in the Navy, in this particular. The department is responsible only for the efficiency of the vessel as defined by the call set forth in the advertisement; while upon the bidding, ship builders will rest the burden of coming up to the mark laid down in the advertisement. This although thought by some to be an impossibility, is by no means a difficult task, and we hope that this is to be the induction of an era in Naval Affairs in which the heaviest draught of water in our future Navy, shall not exceed sixteen feet. We wish our fourteen feet mark had been adopted as the highest; but we shall for the present be content with sixteen feet, and we shall congratulate the Honorable Secretary on this move in the right direction, and while the Department is indebted to this journal for this amount of increased efficiency to the material of the Navy, we shall continue to chart off new channels for improving the right arm of National Defence.

THE INFLUENCE OF MODEL UPON THE SUCCESS OF SAILING SHIPS AND STEAMERS.

THE principles of Resistance and Propulsion which we have considered in former articles, teach that the model involves a large proportion of the elements of a successful ship, whether she be propelled by wind or steam power.

It is notoriously true that different types of model are assigned by merchant, mechanic, and mariner to steam and sailing ships: hence the varieties known as *steamboat*, *steam propeller*, *clipper*, *freighter*, *coaster*, &c. Nor is it less apparent that these several kinds of vessel owe more of their peculiarity to model than mode of propulsion—the fact being conspicuous that steam monopolizes the sharpest models. The steamboat propeller has now no corresponding class of vessel in this country; but the steamship may be compared with the clipper, the ocean propeller with the packet or freighting ship, and the coasting propeller with the coasting sail vessel, to show the correctness of our position.

Now we ask, why is it that the advantage in model is given to the steam vessel? This question is worthy of consideration when it is proposed to repudiate the use of canvass in navigation because of the success of screw steamers, they having become, under proper management, the most profitable description of vessel now in use, on certain routes. We are in fa-

vor of adapting the most profitable description of vessel for whatever trade or route, but desire fair play for all modes of propulsion, and wish to have the merits of each discussed and understood. There are certain lines of trade and commerce which are peculiarly steam routes, and on which the sailing vessel, however finely modelled, would fail as a competitor of steamers, while the reverse is true in other instances. On river or short voyages, and in seas where feeble or adverse winds prevail, the sail vessel may not contend with the steamship or propeller; but on the ocean course, and on voyages of considerable length through seas where fresh winds and strong gales may impel the spread canvass with steam ship speed, the sailing ship may count the ground her own. Nor should she abandon the North Atlantic without a trial with equal advantages of model. The sailing ship which would be calculated to compete with screw ships for the transportation of freight across the ocean lying between the United States and Europe, has yet to be built. The idea of carrying passengers by sail on this route will have to be abandoned. The screw ships are rapidly becoming emigrant carriers, leaving the freighting business only for competition. From this trade sailing ships of proper design cannot be driven by steamers.

It will be interesting and profitable to study the history of steam and sail upon the Lakes of the West during the past fifteen years. Upon the introduction of steam, the steamboat first took the passengers, but the models were comparatively full, although sharper than those of sail vessels, and the boats carried a large proportion of freight; with the increase of passengers, following higher speed and reduced fare, the boats were enlarged and sharpened, and upper deck cabins built to afford accommodations. The success of the steamboat was such as to threaten the prosperity if not the existence of sailing vessels, which had not then attained a burthen above two hundred tons—the average tonnage being below this figure—and built from models borrowed from the Atlantic coast, short and rather full at the ends. The first measure of defence against the encroachments of steamboats taken by the owners of sail vessels, was the *lengthening* of them as a ready means of enlargement. New vessels were built of liberal dimensions, improved models, and simplified rig, and proved successful. At length the screw propeller appeared, but distrustful of its powers, sail was not abandoned on those vessels in which it was introduced, both sail and steam being used for propulsion, as occasion required. The development of the capabilities of the screw vessel, led to the adoption of tonnage at a mark intermediate between the steamboat and schooner, the construction of upper deck cabins, and the final abandonment of sail. This new description of vessel became popular as a [illegible]ger and emigrant carrier, as well as for general freighting, and se[illegible]terfered with the

prosperity of steamboats and sail vessels. But let it be observed, the screw propeller became formidable as a competitor in proportion as the model was improved and the dimensions enlarged. The economies of the engine and propeller became distinguished for efficiency only when displayed on a large hull of fine model, showing that by themselves, little or no advantage was possessessed for propulsion. On board vessels of the same magnitude and model, the propeller engine and screw could not compete with sails for utility.

In accordance with these principles, the propeller has been built larger and sharper than sail vessels, while the latter have followed in its wake as the plain path of vantage ground, and while the observer will find the steam vessel in advance of the Lake schooner, both in model and tonnage, he will discover that the latter is not required to fully equal the former in these respects, in order to hold her own as a freighting vessel. The railroads have relieved the steamboats of entire disgrace in their competition with screw propellers on the Lakes, the few that remain, being required to run in connection with the roads, and therefore built for higher speeds, maintain their places for the passenger business, and thus have driven screw propellers from the trade. Sail vessels on the Lakes are now at least four times as large as before steam vessels were made efficient competitors, and a corresponding improvement has been made in model.

From the foregoing, and from observations of similar import wherever made, we are drawn to the conclusion that the analysis of "Steam *versus* Sail"—a subject now so freely handled by the press, (and from which poetry rather than prose is most abundantly extracted,) is very incomplete without including model and magnitude. The question is one of form and burthen quite as much as mode of propulsion. The figures on the accompanying plate represent the exponential, or elementary solids of displacement of several sailing ships and steamers, from which it will be *seen* the latter have the advantage in model as we have stated. Fig. 1 represents the New York and Liverpool packet "Queen of the West," built by David Brown; fig. 2 is a Quebec built ship from a New York model of most approved style; fig. 3 is the famous Dreadnought, and the sharpest ship in the Liverpool trade. These will represent the best packet ship models extant, and may be compared with the following screw steamers, viz:—Fig. 4, the "Clyde," running from New York to Glasgow; fig. 5, the "Alma," running from Havre to New York; fig. 6, the "Hammonia," running from Bremen to New York.

It is a noteworthy fact, that screw steamers have not generally been built so sharp as side-wheel steamers, and as generally fall behind them in speed; but recently, however, there have been made improvements in screw ship models, and the consequence is that they closely approximate

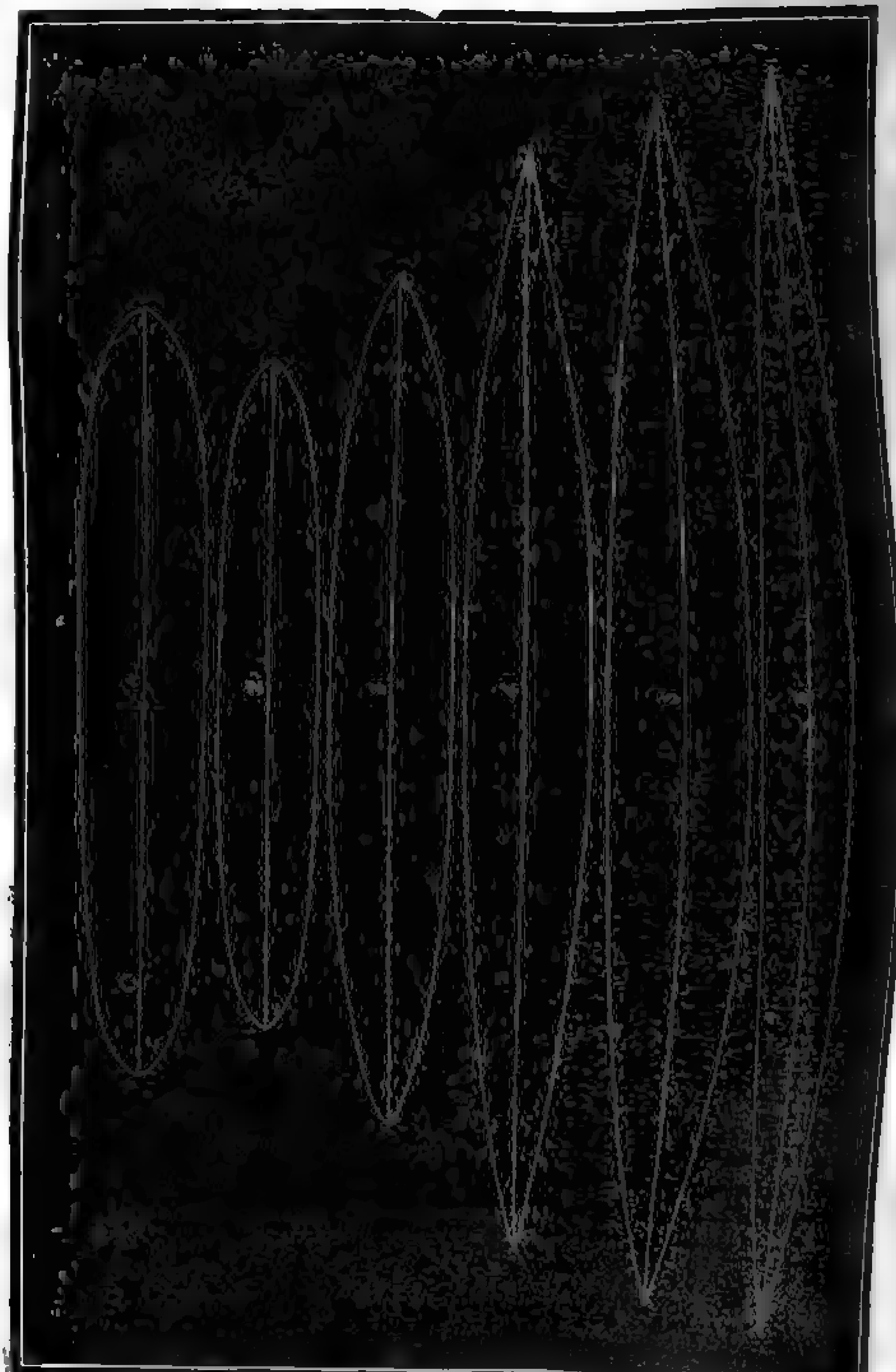
the best performers of side-wheel steamers. We say to owners of sailing ships, that under many circumstances, and for many purposes of navigation, the sailing ship is cheaper in first cost, and in sailing, and can outcarry at equal average speed, a screw steamer. Let canvass have but a fair opportunity to propel a suitable model, and we shall see there is money yet to be made from the idle breeze, the threatening gale, and destructive tempest.

Passengers landed at Castle Garden from Sailing Vessels and Steamers from January 1, 1856, *to June* 30, 1857.

	FROM SAILING VESSELS.		FROM STEAMERS.		TOTAL.	
1856.	*Vessels.*	*Passengers.*	*Vessels.*	*Passengers.*	*Vessels.*	*Passengers.*
January	7	1,057	none	none	7	1,057
February	20	2,246	none	none	20	2,246
March	44	5,549	1	163	45	5,712
April	34	7,033	none	none	34	7,033
May	55	19,441	2	452	57	19,893
June	64	19,136	1	402	65	19.538
Total	224	54,462	4	1,017	228	55,479
July	56	15,579	2	713	58	16,292
August	70	15,599	3	728	73	16 327
September	58	13,863	2	620	60	14,483
October	59	15,672	3	768	62	16,440
November	69	17,393	5	778	74	18,171
December	16	3,891	3	487	19	4,378
Total	328	81,997	18	4,094	346	86,091
1857.						
January	28	5,155	none	none	18	5,155
February	25	3,306	2	185	27	3,491
March	17	2,369	8	1,196	25	3 565
April	67	19,692	6	2,089	73	21,781
May	63	24 802	8	3,046	71	27.848
June	64	20,296	11	3,944	75	24.240
Total	264	75,620	35	10,460	299	86,080

STATEMENT *of the number of Steam Vessels with passengers landed at Castle Garden from January* 1, 1856, *to June* 30, 1857, *showing the flags under which they sailed.*

Steamers under the British Flag	35
" " Hamburg Flag	11
" " Belgian Flag	7
" " United States Flag	2
" " Bremen Flag	1
" " French Flag	1
Total	57



THE PERSIA AND VANDERBILT.

In order that a fair comparison may be made between the Cunard Steamer Persia and the Vanderbilt, we have taken the fourth and fifth passages of the Persia, which were summer passages, with the two first of the Vanderbilt, made at the same season of the year.

Five hours have been deducted from the eastern and added to the western passages of both steamers, and seven hours (the difference between running to Cowes or to Liverpool) is also deducted from the time of the Vanderbilt:

STEAMSHIP PERSIA—FOURTH AND FIFTH VOYAGES.

Name.	*Left Liverpool.*	*Arr. at New-York.*	*Real Time.*		
Persia	July 12, 4.17 P. M.	July 23, 6 A. M.	10d.	18h.	43m.
"	Aug. 23, 3.35 P. M.	Sept. 3, 7.40 "	10	21	05
	Left New-York.	*Arr. at Liverpool.*			
"	Aug. 6, 11 A. M.	Aug. 15, 5.30 P. M.	9	01	30
"	Sept. 17, 9 "	Sept. 27, 7 A. M.	9	17	00
Total time of four passages			40	10	18
Average time of each passage			10	02	34

STEAMSHIP VANDERBILT—FIRST TWO VOYAGES.

Name.	*Left New-York.*	*Arr. at Cowes.*	*Real Time.*		
Vanderbilt	May 5, 1.15 P. M.	May 15, 3.30 P.M.	9	14	15
"	June 20, 12.30 P.M.	June 30, 10.30 A.M.	9	10	00
	Left Cowes.	*Arr. at New-York.*			
"	June 3, 4.30 P.M.	June 14, 12.30 P.M.	10	18	00
"	July 8, 8 "	July 19, 10 A.M.	10	12	00
Total time of four passages			40	06	15
Average time of each passage			10	01	30

The above comparison shows that the Vanderbilt on her first four passages has beaten the time of the Persia, (including her celebrated run) during her fourth and fifth passages by one hour c[illegible]h trip.

THE LAW OF FALSE PRETENCES.

ITS ORIGIN, PRACTICE, DEFECTS, AND REMEDIES.

So LONG as the credit system prevails in mercantile circles, and so long as human nature of the average sort supplies buyers of merchandise who are more industrious in cunning and deceit than in honest labor, so long will the catalogue of false pretenders grow bulky in commercial haunts, and bench and bar continue to boil with the litigation, both civil and criminal, which the offense of false pretences occasions. Within the past five years, the obtaining of goods by false representations, has increased in a surprising ratio, compared with that increase of general crime which naturally succeeds in growing cities. But the reason is rather because, in the rivalry of trade, merchants have laid themselves open to the confidence buyers and lying storekeepers throughout the country, than that buyers or liars have become more numerous and more ingenious. If every mercantile lie that induced a credit, were punishable, and succeeded by conviction and incarceration in State prisons, the latter would be full. But here again, the commercial complainant, feeling how technical the adjudications in false pretences are, and how great the difficulties in the way of evidence become, very naturally "settles" with his fraudulent debtor, and the convictions are, in reality, very few.

It will be the aim of this essay to treat briefly upon the criminal jurisprudence in false pretences; its origin, practice, defects, and remedies.

At common law, the crime referred to was a misdemeanor, and it is so yet in many States of the Union. In New York State it is a hybrid offense—half misdemeanor and half felony—punishable with the "minimum" of fine, or the "medium" of county jail, or the "maximum" of State prison, according to the circumstances of the case, and the feelings of the sentencing judge. And this is the reason why the New York executives for many years have refused to issue requisitions to certain States against offenders who cheat through false pretences. The present Governor requires, before a warrant to another State shall issue that the District Attorney certify to the likelihood of a conviction; and all chief magistrates have exacted that complainants pay the expenses of sending for offenders against the law in question. It is not obligatory to surrender a fugitive from justice, and in case of mere misdemeanor the Governor, upon whom warrants are drawn, decline a commitment. Thus, a risk of a non-delivery, and the variation in the grade of offense from State statute book to State statute book, have compelled the establishment of these executive rules.

The mere cheating by means of a naked lie, was never indictable, and

there must have always accompanied the act such circumstances against which common prudence could not have guarded. A learned judge in the very infancy of criminal law, quaintly said, "We are not to indict one man for making a fool of another; let him bring his action." And this general principle, with some modifications, and varied by circumstances, has been taken into the law of statutory "false pretences," wherein positive phrases define and limit the offense. "Legislatures," said a judge of high learning, "saw that all men were not equally prudent, and the statute was passed to protect the weaker part of mankind." And it may be averred that every case of false pretences must be judged of by its relation to its own circumstances and its own actors. It is erroneous to lay down the general rule of "ordinary caution, "common prudence," and the like, which fall from the lips of some judges—meaning that this caution and prudence must appear to be used by a seller before he can complain of being outraged by a buying pretender.

Peter Funk might well deceive a newly arrived emigrant by representing that a brass coin used as a trade card, was a half-eagle, when the President of the Chamber of Commerce would never have been insulted by such a story; and Messrs. Tape & Fringe might well be excused trusting a Milwaukie merchant, who presented bonds to a large amount as vouchers of his responsibility, when their neighbors, defrauded by a pedlar who told them that he owned two lots around the corner, (they never going to inquire,) would have only a common civil remedy.

The statutes of different States pronounce differently upon the crime. This is not as often thought of by merchants as it should be. In Massachusetts the obtaining of goods must have been decisively the effect of the false representation—whilst in New York, Pennsylvania, Maine, and other States, the false pretences need not have been the *sole* cause of the credit, but it is there sufficient if these exercised a *controlling influence* The reason is, that in the latter States the statutes say of the obtaining "by *color* of," &c. The former State law uses absolute words.

The *corpus delicti*, or essential elements of the crime in this offense, consists of these parts:—

1st. The pretences by means of, or controlled by which (varying in States) the credit is obtained.

2d. The falsity of the pretence.

3d. The fraudulent intent of the transaction, and each part must be proved by original evidence.

A great error is committed by many complainants in procuring only general evidence, often hearsay, of the "falsity" of the pretences, and nearly always neglecting circumstances that go to make out fraudulent intent. If the pretences are in writing, and signed by the party charged, of

course this settles the first part. If they were verbal, then the words charged, ought to be proven by two witnesses. The falsity cannot be proven by the declarations or repentant confessions of a defendant—for it is a stern and inflexible rule of criminal law, that no part of the *corpus delicti* shall be proved by a mere oonfession. The latter adds weight to the principal fact merely; nor by the result of inquiries—for this is hearsay. The third part can be most generally proven by the circumstances of purchase, or by those of disposal of the goods, by fraudulent use of the credit, or by showing that other persons beside complainant have had similar stories told, or similar pretences made to them by the accused.

Cases are numerous wherein men who thought they were solvent, in reality were insolvent, but ignorant of it, and where they had probable cause for believing the truth of what they said. These, of course, are outside of fraudnlent intent.

Pretences have been found in experience to relate to a defendant's means, or character, or responsibility, or specific property, or nature and valuation of particular notes, or things exhibited at time of sale, and these pretences must rigidly relate to a past transaction—they must refer to a past event.

Promises or speculations dependent upon something to come, or something to be done, never give criminal weight to pretences however false they prove to be, because *it may be*—there is in other words a reasonable hypothesis—that *when* the defendant promised or gave speculative assurances, he meant honestly and afterwards changed his mind. If, however, his story, so to speak, is historical, no such hypothesis of innocence can be raised, nor need these pretences be in words. False conduct, false deeds, false samples merely shown, and false assumptions, can and do excite confidence and credit, and very often are more artful than direct assertion—provided that the fraudulent deduction is not a forced or erratic one.

A mere representation by an accused that he is worth so much property in value—is a man of fortune, or of low means, or the like, when expressed in generalities—does not come within the scope of the law. There must be *some* (very weak will often be allowed) particularization. Men are often mistaken in their *conclusions* upon their own and their neighbor's standing. Conclusions are never evidence, except from experts. If Mr. A should assert, "I am a "millionaire," or, "I am a man of large fortune," or, "I am worth a hundred thousand dollars," the courts, unless more particular allegations of *fact* are made, will not heed the pretences. If any *specifications* are made, however general the main story may be, and they control credit, and on their face are reasonably true to common sagacity, they will be considered as, for instance, "I am a millionaire, and

own a thousand shares of Illinois Central," &c., &c. And in all cases where a merchant suspects or fears the honesty of a proposed buyer, (but query, whether in such a case an instant stoppage of the trade is not most prudent,) and procures a statement, let him have particulars as to means and responsibility, and descriptions, and full references as to the same. If he has at hand opportunities to inquire readily as to these, it is his duty in law so to do—for it is not his own loss he is to guard against, but he is to protect the public also.

Obtaining money by "bogus checks" is a very common offense. This is an instance where false conduct (as the mere throwing down of a check with request for change, or making it the *precedent* act of obtaining property) will sustain the allegation of a false pretence. Here the distinction, as to the past and the future, often misleads. A check passed to-day, but dated ahead, will be no false pretence, for the hypothesis that the money *may* be deposited in the designated bank, will accompany the primary presumption of innocence; and the making of the check, or the presenting of it, coupled with general knowledge of mercantile usage, without any assertion being made, is of itself a direct pretence in law. And it is enough to prove the altering of the check, and that the defendant had no "account" (not funds) at the bank—or that, having had an account, he had formally closed it, or had been ordered by the bank so to do, and been forbidden to reopen account.

The pretences need not be made by a party in person in order to render him liable. A letter dated in Chicago and received in New York, uttering false stories to induce credit, would render the writer liable in the place where the letter was received; or if he sent an agent from the distant place to make the representation, he is guilty at the place of making.

This doctrine of criminal proxy in the offense under consideration, was eloquently and learnedly discussed in the case of the People *vs.* Adams, a Western forwarder, who obtained goods from the house of Suydam & Co., and, although he was not in New York until trial, was committed.

There is no offense which, when prosecuted, is so difficult to obtain conviction upon. In the first place magistrates and grand jurors, with the petit jury in the last place, are possessed with the idea of pecuniary interest in the complaint over and above that public regard which should control all prosecutions, and therefore regard the evidence with mistrust, and their moral convictions insensibly require a greater degree of evidence than is asked in ordinary offenses.

The large number of complaints made, which are either frivolous or avaricious, do much to prejudice public prosecutors. Said a judge in a ne boring State, "The act is intended to punish a criminal offense, not used as a means of collecting debts, however just; and to suffer

perverted for that purpose, will necessarily lead to great injustice and oppression. We are not without reason for believing that it has been already used as an instrument to wring money from the sympathy and fear of friends, as well as a means of extortion from the timid on pretended demands." This shows that a similar feeling has been imparted to the bench. The very many frivolous and debt-collecting cases thus prejudice the few good ones, and there is no doubt upright merchants and strong cases have frequently suffered in consequence. But the bench is disposed to be extremely technical on the questions of false pretences, and thus innate difficulties are enhanced by those extrinsic.

Therefore, in all prosecutions, care should be taken to have the case as strong as possible at the outset. The point most necessary to fortify, is the second part of the offense—that the pretences are false. And inasmuch as in criminal cases for the prosecution no commission to take testimony issues, and the witnesses are compelled to confront the accused, much of evidence is necessarily lost. The great majority of offenders are out of the State—the pretences they made, were of home matters, and foreign witnesses cannot be compelled to attend. If the pretences were of their home means, their ownership at their residence, etc., as is nearly always the case, then the best evidence comes from the vicinage where the offender lives. It is always the most difficult thing to prove a negative. Most proof in false pretences, as to the fraudulent lie, unfortunately calls for this kind of ultimate proof.

It only remains to add that persons who complain of false pretenders, and desire to be successful, must "come into court with clean hands." If the transaction on their part is tainted with moral obliquity, as in the Court of Chancery, "those who seek equity, must do equity." So in the Court of People's Pleas—they who seek to punish dishonesty in this matter, must not have been *particeps criminis*. And the cases are numerous where the lying seller, although outwitted by the lying buyer, finds that he is not allowed the use of the people's writs to punish the crime against him.

The brief moral of the present condition of "criminal jurisprudence" regarding false pretences, is that merchants should be doubly cautious as to who they sell to; and that if they sell upon unsupported or uncorroborated pretences, they must put into the crucible of profit and loss the elements of legal technicalities and difficulties against their punishing the offender. Especially should the members of the commercial community endeavor not to prejudice their good cases by prematurely originating those that are frivolous, or to be used as collecting suits.—*Merch. Mag.*

Commerce of New-York.—During the last quarter of the fiscal year ending 30th June, 1857, there has *arrived* in the District of New-York—

United States Vessels,	945;	444,190¼	Tons;	13,844 Men.
Foreign do.	315;	149,997 3-4	"	5,765 "

During same period, *cleared:*

United States Vessels,	579;	340,622¼	"	10,592 "
Foreign do.	296;	133,770¼	"	5,473 "

Coasting Vessels *Arrived*—under	Register, 160;	79,230	Tons.
	Licensed, 298;	69,798	"
Cleared— "	Register, 406;	144,728	"
"	Licensed, 835;	235,370	"

DISASTERS AT SEA.

SHIPS.

St. Bernard, at Bombay, from Liverpool, lost mizzen mast and other spars.
Stephen Larrabee, Newport, E., for Havana, totally lost, June 1, on the Colorados.
Falcon, New-Orleans. for Bie, totally lost May 24, near Louisburg, C. B.
Northern Light, Boston, for Manilla, lost some spars and sails.
Rebecca, at Liverpool, June 4, from New-Orleans, leaking badly.
Noonday, at San Francisco, lost fore and main topsail yards, sails, &c.
Lotus, London, for Boston, in collision with French Ship, lost bowsprit, &c.
Squando, New-York, for Quebec, got ashore east of Halifax early in June.
Jacob Bell, lost both anchors and grounded at Shanghae.
Cerro Gordo, grounded in the harbor of Shields—got off.
Samuel Willetts, Liverpool, for New-York, lost at Squam Inlet N. J., June 30.
Gosport, Liverpool, for Baltimore, went ashore near Cape Henry, July 3.
Vaucluse, Miramichi, for Bristol Channel, went ashore on Esquinane Point, June 29.
W. M. Rogers, of Bath, foundered at sea; Captain, 1st and 2d officers, and 9 seamen lost.
Fanny Forrester, New-York, for New-Orleans, got ashore at Benini's Islands.
Consignment, in collision with ship at Cardiff, much damaged.
Constitution, at Southampton, was in collision with steamer Genova.
Provisionel, (Spain) for Barcelona, put back to New-Orleans, leaking badly.
Harmonie (Fr.) got ashore on the N. breaker in leaving Charleston Harbor.
Sea Ranger, Boston, for San Erancisco, put into Rio Janeiro, April 24, in distress.
Hampton, (Hamb.) St. Johns, N F., for Saguna, totally lost April 25, near Port Royal.
Syringham, at Calcutta, March 25, from Boston, had grounded in the river.
Leira, at Rotterdam, for Baltimore, lost Bowsprit in collision.

BARQUES.

Genl. Taylor, Philadelphia, for Portland, got ashore west side of Nantucket, June 2.
Rebekah, at San Francisco, much damaged by a sea and is leaky.
Wyman, for Cape Town, returned to Boston June 14th, leaky.
Sanford Acorn, (new) Boston for Mobile, totally lost at Abaco, May 22.
Napier, of New-York, totally lost off Rio Grande del Sur.
Beta, for Boston, put into Belfast leaking, &c.
Mary F. Slade, at Philadelphia, from Charleston, lost main topsail yard.

Lightfoot (Bark antine) for San Francisco, lost on a shoal, coast of Zambales.
Genl. Taylor, Boston, for New-Orleans, put into Bermuda, leaking badly.
Helen, Montevedio, for Antwerp, put into Cork, leaking badly.
Lincoln, Antwerp, for Boston, put into Cork very leaky.
M. B. Harriman, Bordeaux, for New-York, in collision and put into Rochell.
W. H. Brodie, New-York, for Mobile, blew up June 13, had powder aboard.
Chilton, Sagua la Grande, for Baltimore, went ashore June 20th, at Smith's Point.
Lauretta, Navy Bay, for Kingston, Ga., totally lost on Pedro Shoals, June 3.
Edward, Boston for Mobile, totally lost June 19th, on Bimini Islands.
Alvarado, at Portland, from Cardenas, lost Bowsprit, &c., in collision.
Sherwood, at Boston, lost jib-boom by collision.
Milford, Mazatlan, for Cork, put into Rio Janeiro in distress.
La Pierre, probably from Cadiz, totally lost April 8, off Rio Grande, one man lost.
George, Vera Cruz, for Laguna, struck and foundered May 4, at Laguna.

BRIGS.

J. W Havener, at Savannah, from New-Orleans, ashore on Martin Industry's shoal.
Thomas Trowbridge, for Guayama, in collision with propeller Petrel, much damaged.
Molly Stark, Boston, for Australia, had been on beam ends—was makin for England.
Cynosure, Rockland, for New-Orleans, burned to water's edge at Elliot Key, May 25.
Monica, Sagua, for Baltimore, ashore June 13th, on Thomas' Point.
Friederich, Cronstadt, for Boston, ran ashore May 26, near Aberdeen, Scotland.
Vulture, for Hampton Roads, put back to Montevedio leaky, early in April.
Jane, (Brigantine,) Sidney, N. S., W., for Richmond, totally lost on Stradbroke Island, Feb 17.
Henry Hicks, (Br.) for St. Johns, N. B., got ashore in Muscogat, afterwards on N. Rip, Nantucket.
Ellen, (Br.) Liverpool, for Newfoundland, was abandoned May 15.
Oregon, Georgetown, S. C., for Boston, was spoken, leaking badly, had grounded.
Martha Rogers, New-York, for Pictou, totally lost on Cape Sable.
H. B. Crosby, Bangor, for New-Haven, in collision June 15th, put into New Bedford.
Lucy Atwood, at Barbadoes, from Norfolk, lost one man and part of deck-load.
Australia, at St. Thomas, in distress, from Rio Grande, lost sails.
Mary Morton, New-York, for Hautsport, went ashore June 1st, near Point Judith, L. H.
British Lion, (Br.) towed into Savannah, had been aground and broke her back.

SCHOONERS.

Broadfield, for Boston, much damaged in a collision, put into Lewes, Del.
Invincible, at Newburyport, drifted on the rocks and filled.
J. H. Ashmead, capsized below Philadelphia, May 26 was towed up.
Reindeer, from Ocracoke, lost spars, &c., leaking badly and abandoned.
Edwin Reed, Boston, for Philadelphia, went ashore June 17th at Cape May.
Lydia Gibbs, at Norfolk, from Providence, in collision with schooner, both much damaged.
J. C. Fremont, in contact off Isle-au-haut with ship, lost bowsprit, cut-water, &c.
Jacob Burroughs, Baltimore, for Charleston, totally lost June 11, near Beaufort.
Alfred, (Br.) New-York, for St. Johns Inlet, N. F., totally lost at Gabarus, C. B.
Patriot, Salem for Bangor, totally lost at Whitehead, Me., June 26.
Mechanic, of Surry, went ashore June 26, at Whitehead, Me.
Peru, (140 tons) was abandoned, afterwards towed into Rockport.
Juliet, Hartford, for Boston, ran ashore June 23, at Highland Light.
Pigeon Hill, (sloop,) got ashore in Gloucester Harbor, on Eastern Point.
Hill Carter, Philadelphia for Boston, sprung a leak, put into Newport.
Elden Ripzah, of Newburyport, ran on a ledge of Rocks in West Canso.
Gull, of Newburyport, totally lost, June 22, below Whitehead, Me.
Empress Baltimore, for Bangor, totally lost near Herring Gut.
Catharine, Calais, for Norwich, lost foremast, &c., put into Newport.
Priscilla, Gloucester, for Salem, totally lost at Norman's Woe, July 2.
Exile, at Patuxent River, lost masts June 29.

Transit, Laguna, for Hamburg, put into Boston leaky, had been aground.
Eckford Webb, (Tern.) at Nassau, N. P. for Apalatchicola, had been ashore.
El Dorado, Boston, for Columbia, went ashore on Shoatuck Island, June 22
Othello, Machias, for New-York, sprung a leak and filled May 20th.
Broadfield, Philadelphia, for Boston, in collision, put into Lewes, Del.

NOTICES TO MARINERS.

QUARANTINE.—Notice is hereby given that all vessels arriving at this port, from any port or place south of the latitude of Wilmington, N. C. or via any port in the United States, where they shall have been held in quarantine are required to be brought to anchor at quarantine ground, and remain there until they shalll be visited by the Health Officer, and permission in writing from the Board of Health shall be obtained for vessels so detained to enter the harbor.

The Pilots and Harbor Masters are required to attend to this notice and see that it is duly complied with.

R. W. BOWDEN, President Board of Health.
T. G. BROUGHTON, Secretary.

Office of the Board of Health, Norfolk, Va., May 20, 1857.

The Quarantine Ground.—The anchorage at Quarantine is between block buoys numbered 5 and 7, with yellow flag on Lambert's Point, bearing about SE by E, and not to bring buoy No. 7 to range with the yellow flag on Lambert's Point.

On the 15th of November next, the fixed light at Prince Bay Light House, Staten Island, New-York, will be discontinued, and a fixed light varied by flashes. of the fourth order, Fresnel System, substituted for it.

By order of the Light-house Board,
A. LUDLOW CASE, Light-house Insp.

New-York, June 12, 1857.

Report of Capt. Mann, of the Br. bark Strathmore, on her voyage from New Zealand to Foo-choo-foo:

"Dec. 4. saw an island bearing E by N at 8 A M, and at 10 A.M. saw another island bearing NW by W. From the ship's position they must be the Mitre and the Cherry Islands shown on the chart as doubtful. At noon two canoes were in sight from Cherry Island, but we having a fine breeze, they did not get alongside. At 5 P.M. passed over a shoal with four or five fathoms of water upon it. Could see the bottom very distinctly—sand and rocks. The bottom was not seen until passed over it. A space of 150 yards, or there abouts, may be the extent of it. I consider it in the latitude of 11° 9′ S, and the longitude of 170° 42′ E, and I believe it has never been discovered before. I call it the Strathmore Shoal."

BANKOK, March 28, 1857.—The Gulf of Siam has along its coasts generally a depth of water about 9 or 10 fathoms, and about 59 fathoms in its centre; the navigation of this gulf is safe and easy; there is during the NE monsoon a current of about three miles the hour running from north to south, and in the SW monsoon it runs in the opposite direction, from June to the middle of October. There are no [illegible] ricanes in [illegible] ulf during the year. From the city of Bankok to the [illegible] (if over [illegible] feet draught of water), the distance by ship's boat through [illegible] sels working up the river it is 40 miles; boats taking the tide [illegible] anchorage in 2½ hours' time: width of the river from outer [illegible]; the water deep, except at the bar, and the shores are [illegible] re occurrence

to shipping, with ordinary care; large vessels frequently load to a draught of water that they can carry over the bar to the outer anchorage, their loading being afterwards completed from lorcha and native craft.

NANTUCKET HARBOR, MASS.—Notice is hereby given, that a stake-light will be placed in range with the eastern beacon at the cliffs, Nantucket, for crossing the bar at the eastern marks, in five feet of water at low tide. The stake is 15 feet high, painted black; the illuminating apparatus is a large lens lantern for the stake, and a lamp and 21 inch reflector for the beacon. They will be exhibited on the 1st day of June and thereafter.

In coming in, bring Brant Point Light to bear south, and run for it until the stake and beacons are in range. Run in on this range until the beacon light at the head of the harbor is nearly in range, but open a little to the eastward of Brant Point Light; then run in on this range, gradually opening the beacon more to the eastward until it shuts in behind the farm house; then run south into the harbor.

By order of the Light-house Board,

C. H. B. CALDWELL, L. H. Ins., 2d Dist.

BOSTON, May 8, 1857.

THE WRECK OF THE BARK BYRON, which has only ten feet over it at low water, is nearly in the mid channel way one-third of a mile southwesterly from the red buoy No. 14, of the Upper Middle. The Hook Light, a little open to the east of the East Beacon, leads upon it; keeping the two lights of the ship channel in range, carries you about three ship's length to the westward of it.

A wreck buoy will be placed upon it by Commander Case, the Light-house Inspector for this District, at the request of the Pilot Commissioner. GEO. W. BLUNT

NEW-YORK, MAY 22, 1857.

EGG ROCK LIGHT, OFF NAHANT.—Notice is hereby given, that the fixed white light at this station, will be changed on the night of June 15th, and thereafter to a fixed white light.

This change will be made in order to remove all danger, by vessels mistaking the Light for Long Island Head Light, when approaching Broad Sound from the northward and eastward. By order of the Light-house Board,

C. H. B. CALDWELL, L. H. Inspector, 2d Dist.

BOSTON, May 22, 185[illegible].

The Court of Directors of the East India Company have lately received from the Government of Bengal, the following Notification, which is published for general information:

HOUSES OF REFUGE AT THE ENTRANCE OF THE MUTLAH, FOR SHIPWRECKED MARINERS.—The Houses of Refuge are numbered in succession to those already erected on the sea-face of the Sunderbunds, and are situated as follows:—

No. 4. Painted White—Erected on the south-east part of Dalhousie's Island, at the Eastern entrance of the Mutlah River, on a sandy patch, about five feet above high-water mark, and about 100 feet in shore, distinguishable by a White Flag from a long spar and bamboo, which have been put up close alongside of the House, visible considerably above the surrounding trees.

No. 5, Painted white.—This House is erected on Bangadoonee Island, about seven miles eastward of No. 4. It stands on the SE part of the Island, above a small sandy beach, about 100 feet from high water mark. A long spar and bamboo, with a flag, have been put up alongside, and may be seen considerably above the trees.

In each house there is a supply of water and biscuit, a Catamaran and paddles, a letter of instructions, and a Chart of the Sunderbunds.

By order of the Officiating Superintendent of Marine,

H. HOWE, Secretary.

FORT WILLIAM, the 7th of March, 1857.

Published by order of the Court of Directors of the East India Company,

JAS. C. MELVILL, Secretary.

EAST INDIA HOUSE, 26th May, 1857.

APPROACHES TO PORTLAND HARBOR, ME.—The following changes in the buoys, &c., marking the approaches to Portland Harbor, Me., have been made:

Alden's Rock.—An iron bell buoy, painted black, having the words "Alden's Rock" painted in white letters on both sides of the frame, is stationed to mark this rock, in lieu of the spar buoy formerly at that place.

Trundy's Reef.—A nun buoy, painted black, with the letters "T R 9" in white, on each side, is placed in lieu of the spar buoy.

Spring Point Ledge.—A nun buoy, black, marked "S. P. L. 11," in white letters, on each side, is placed instead of the spar buoy.

Stanford's Ledge.—A nun buoy, black, marked "13" in white letters, has been placed instead of the spar buoy.

The other aids to navigation in and about this harbor remain unchanged.

By order of the Light House Board,

GEO. H. PREBLE, L. H. Ins. 1st Dist.

Portland, Me., May 27, 1857.

BILLINGSGATE ISLAND, WELLFLEET BAY, CAPE COD.—Agreeably to previous notice the temporary stake light at this station has been exhibited, and the third class nun buoy, black, No. 1, placed on the end of the shoal in twelve feet water at low tide.

The following magnetic bearings are given from the buoy:—

Stake Light	E by N½N.
Old Light-house	E by N
Signal Staff on Scargo Hill	SW¼W
Provincetown Town House	N3-4E

By order of the Light house Board,

C. H. B. CALDWELL, Light-house Ins. 2d Dist.

BOSTON, June 1, 1857.

A spar buoy, painted with red and black horizontal stripes, has been placed, by request of the Pilot Commissioners, to mark the wreck of the bark Byron, in the Main Ship Channel, lower bay of New-York.

It lays in five fathoms water, on the northwest side of the wreck, about two-thirds of a mile below the West Bank buoy, No. 1, and two hundred yards west from the Red Nun buoy, No. 16, on the north end of the Upper Middle. It can be passed on either side, but it had better be left to the Eastward, as there is but little room between it and the bank. The ranged lights for the Main Ship Channel in one will lead well clear of it.

The Craven's Shoal and Diamond Reef buoys have been replaced.

By order of the Light-house Board,

A. LUDLOW CASE, Light-house Insp., 3d Dist.

New-York, June 1, 1857.

MISCOE LIGHT.—Notice is hereby given that a red light is now exhibited on the NE point of Miscoe Island, in lat 48 01 N. lon. 64 29 28 W, as determined by Commander Orlebar, of the Admiralty Survey. It stands 76 feet above high water, and can be seen in clear weather at a distance of 12 miles. A shoal extends 3 miles on a N by E compass bearing from the light, but on other bearings the light may be approached from the eastward to within a mile from the shore.

JOHN HARLEY,
GEORGE KERR,
R. HUTCHISON,
Commissioners of Lights for [illegible] S[illegible]wrence.

Miramichi, June 5, 1857.

HUE AND CRY ROCK AND ALDEN'S ROCK, OFF [illegible] MAINE.—Strangers bound to Portland, Maine, with vessels [illegible] draught [illegible] in ap-

proaching Cape Elizabeth lights at the outer entrance to the harbor, to pass to the Eastward of the Hue and Cry and Alden's Rocks, leaving the Black Bell Buoy on the latter, on the port hand in going in

From near the Black Bell Buoy, placed to mark Alden's Rock, steer by compass N.N.E., until Portland Head Light House bears NNW, or NW by N, when follow the directions laid down by Blunt in the American Coast Pilot

Hue and Cry Rock will be marked during the summer and fall by a black can buoy, marked No. 1, and during the winter mouths by a Black Spar Buoy, marked No. 1.

The eastern light-house tower (fixed light) on Cape Elizabeth, bears from the buoy NW by N, distant 4 miles.

Alden's Rock will be marked by a black boat-shaped Bell buoy, surmounted by a frame work and bell, with Alden's Rock painted conspicuously on each side of the frame work in large white letters, and No. 3 painted on the mast supporting the bell. The bell is supported at an elevation of 12 feet above the water, and should be heard under ordinarily favorable circumstances, one mile depending upon the force and direction of the wind.

The Bell Buoy is moored in 14 fathoms water, distant about 500 yards in a SE 1-2 S direction by compass from the shoalest part of the rock or ledge.

The obstruction to navigation known as Alden's Rock is, according to the report of the latest examinations made by the Coast Survey, 317 yards long, in a NE and SW direction, by 83 yards wide, with irregular soundings upon it, varying from $4\frac{1}{2}$ to 24 feet at mean low water.

The following are compass bearings from the Bell Buoy:

To Cape Elizabeth (Eastern Light House, fixed light)	NW by W$\frac{1}{4}$W
To Western light-house, revolving-light	NW by W 3-4 W
To Taylor's Reef Buoy	WNW
To Wood Island Light House (red revolving)	SW by W$\frac{1}{4}$W
To Trundy's Reef Buoy	NNW$\frac{1}{4}$W
To Broad Cove Rock Buoy	NW by N
To West Point of Ram Island	N by W
To Cape Small Point	NE by E3-4E

By order of the Light-house Board,

GEO. H. PREBLE, L. H. Ins. 1st Dist.

Portland, Me., June 8, 1857.

The Fenwick Island Shoal Bell Boat having been run into, is withdrawn for repairs, and an iron nun buoy of the second class is placed to mark her position.

By order of the Light-house Board,

EDWARD M. YARD, Light-house Inspector.

Philadelphia, June 19, 1857.

POINT ISABEL LIGHT-HOUSE, BRAZOS SANTIAGO, TEXAS.—The fixed light at Point Isabel, Texas, will be changed to a fixed white light, varied by flashes, on the night of the 1st of August next.

The apparatus is catadioptic, of the third order of the system of Fresnel, and will be elevated 82 feet above the level of the sea. The light should be seen under ordinary states of the atmosphere, from the deck of a vessel 15 feet above the water, 16 nautical miles.

By order of the Light-house Board,

W. H. STEVENS, L. H. Inspector.

Galveston, June 22.

COVE POINT, CHESAPEAKE BAY.—The fixed light varied by flashes, which was extinguished at Cove Point on the evening of the 15th inst, has been again exhibited.

The light is of the 4th order of Fresnel, illuminates the whole horizon, and shows a flash at intervals of one minute and thirty seconds.

By order of the Light House Board,

W. H. MURDAUGH, L. H. Inspector.

Norfolk, June 30, 1857.

YACHTS—THE "ROWENA" AND "MOSQUITO."

Among the Yachts of the second class engaged in the Regatta of the 4th of June last, none won greater distinction for sailing qualities than the *Rowena*. By the courtesy of her spirited owners we are permitted to publish her lines for the edification of the yachting fraternity, now rapidly increasing in numbers in the United States. At least ten new yachts have been added to the fleet of the New-York Yacht Club within a few months. The largest one is named the "*Wanderer*," and is about 250 tons measurement. She is the property of Mr. Johnson, of this city. The affairs of the New-York Yacht Club are now under most efficient management; the property at the Club House in Hoboken is under the charge of a zealous and competent steward, and every laudable inducement is offered to the public-spirited commercial and nautical men of our seaboard to join the Club, now numbering many hundreds.

The *Rowena* is owned by Messrs. M. W. Bacon, M. K. Cady, W. E. Saxe, & Wm. B. Tate. She is 56 feet long on deck, 52 feet 9 inches on the load line, which is placed at 4 feet 3 inches above the top of keel. The planksheer is 21 inches above the load line. The moulded displacement is 1,816 cubic feet, or 51.88 tons. The timbers of frame is sided 6 inches, and moulded 5 inches; the plank of bottom is 2 inches thick, of oak; the wales are 2½ inches in thickness; the deck beams are 5 by 7 inches. She is sloop rigged, the mast being stepped 17 feet from the bow. The sails of No. 3, 16 inch yacht duck. The *Rowena* cost $4,000.

The "*Mosquito*" is the famous British yacht that won a race in a contest with the renowned *America*, after she had passed from the hands of our countrymen however. Her history is singular, and affords a hint of the value of seamanship in bringing out the qualities of a sailing vessel. She is built of iron, by Mare, of Blackwall, in 1848. There appears some doubt in regard to whom the honor of her design belongs. Ditchburn and Waterburn both claim it. On her first appearance she won a prize, beating the Arrow, Heroine and others, but for some years she was rather an unfortunate vessel, being generally beaten. In 1852 she changed commanders, and the result was soon manifest. In 1852 and 1853 the *Mosquito* was engaged in sixteen races, and was [illegible] but once by a foot or two only. During this victorious career she [illegible]d to nearly every fast yacht afloat. The America, Arrow, [illegible], Cynthia, Aurora, and Julia were among those that [illegible] the wonderful sailing properties of the formidable M[illegible] [illegible]r remarks:

"The *Mosquito*, although constru[illegible] [illegible]any of the qualities for which the America was [illegible] [illegible]ears after-

wards; the angle of the load-water line forward in the former, is but one degree less acute than in the latter, and the position of the several centres of gravity and of the midship section is farther aft than was usual. By a careful comparison of the elements of their construction we shall find that in many principal proportions there is great similarity between the America and Mosquito. It may be doubted whether the Mosquito would have answered had she been constructed of wood: her keel and garboard plates were of very thick iron, weighing several tons; this added to the thin material of her bottom, admitting the ballast to be stowed near the keel, brought the centre of gravity of the ballast very low down, and enabled her to carry immense sails. She differed from the generality of racing yachts in one important particular, as she had large cabin space, and had upwards of seven feet height between decks, and in complete opposition to the commonly received notions concerning racers, that internal fittings are detrimental to speed, she had five complete bulkheads across her besides two half partitions. As it may be interesting to many yachtsmen to know in what manner she was prepared for racing, I may state that on no occasion was any bulkhead ever removed; the doors were sometimes taken down, the sofa lockers removed and taken out of the vessel: the contents of the forecastle and sail room aft were transferred to the main cabin, together with the windlass, anchors, and any weighty part of the equipment, which were placed under the platform of the cabin.

The principal fault in the construction of the Mosquito was the excessive fullness of her water line abaft, which caused her to drag a large wave on the lee quarter.

Length on load line	59.2 feet.
Load displacement in cubic feet,	2,424
" " in tons,	69.25

The dimensions of her spars were as follows:—

	feet.	inches.	*Greatest diam.* inches.
Length of mast, heel to cap	51	10	13¼
Hoist of main-sail	37	3	
Length of masthead	9	7	
" top-mast (heel to sheave)	37	6	
" boom	52	6	12
" gaff	37	0	
" bowsprit	46	6	13
" Do. (housed)	12	6"	

THE

U. S. Nautical Magazine,

AND

NAVAL JOURNAL.

VOL. VI.] SEPTEMBER, 1857. [No. 6.

WILL THE GREAT EASTERN PAY?

The solution of the problem under the above caption has in our own mind been resolved *mechanically* and *commercially*. Under these heads we propose to give the world the benefit of our views, upon an enterprise which has engrossed the attention of commercial minds on both sides of the Atlantic.

The great size of this vessel, being nearly double the length of any other sea-going vessel now afloat, is claimed to be one of the great points of mechanical advantage in the enterprise. The significance attached to this point is to us truly surprising, believing, as we do, that the best informed minds upon mechanical subjects in England, are not ignorant of the principles upon which the laws of navigation are based. There are three prominent points in every vessel, viz: length, breadth, and depth; and upon the proportions these bear to each other must depend, to a very great extent, the success of every enterprise, of a nautical nature, which has an alliance to, or is based upon, the laws of *mechanics*. Now one of the advantages claimed for the Great Eastern, is her great capacity for cargo and passengers, consequent upon the suitability of these dimensions, and at the same time great stress is laid upon her great length, thus stamping all other vessels as disproportioned; for if the Great Eastern is well-proportioned, then all other vessels must be ill-proportioned. Hence, it is not strange that her projectors should become strengthened in their convictions, by long indulgence in the belief, that the Great Eastern is right, though all the world in practice, and all the *savans* in science be wrong. This vessel is 8.5 times as long as she is wide; [illegible] is the fastest sea-going steam or sailing vessel which has ever bee[illegible] not exceed 6 feet of length for one of breadth. It may b[illegible] these circumstances, to enquire what is expect[illegible] be gain[illegible] propor-

tion between the length and breadth. For if the same proportion were found in this vessel to which others usually conform, there would be no particular stress laid upon her length; it would be quite as proper to speak of her great breadth, or her great depth, as to emphasize her great length. It is because she has a greater proportion of length to the breadth, than is usual in vessels of her class, that this prominent feature in her dimensions is referred to. The general impression is, that excess of length is an advantage; but few men of experience, however, regard excess of depth as advantageous, hence we hear nothing said about the advantages to be gained by the *great depth of the Great Eastern.* We propose to show that excess of length, scarcely less than excess of depth, is calculated to render a vessel unprofitable; more particularly when that excess is consequent upon a determination to increase the speed of the vessel.

But if we take in the depth as one of the elements in proportioning this vessel, we shall find that she is not as long, proportionately, as we had supposed; we shall find that her depth becomes the prominent feature in her principal dimensions—hence her excessive draught of water. If we drop the principal dimensions, and take up her draught of water, we shall find that she possesses all the elements which constitute other vessels failures, of only one tenth her size, viz: great depth and heavy draught of water; because a vessel cannot have the latter without possessing an undue share of the former; great stress has been laid upon the advantages the Great Eastern will possess over smaller vessels in overcoming the motion of the sea by her increased size, and Dr. Scoresby's voyage across the Atlantic has been alluded to repeatedly, to show, in general terms, the principal dimensions of the Atlantic wave, in open sea. Dr. Scoresby is not far from the truth in his proportions, as set forth in his remarks upon the subject, but how very far wide of the mark the projectors of the design of the Great Eastern have come, in conformity to the same law, we shall endeavor to show. Dr. Scoresby gives us an approximation to the length of the wave under different circumstances, but he does *not* tell us that the wave is not buoyant in proportion to its bulk; now it is this fact that will constitute the greatest difficulty with this vessel. It is a truism which will not be denied, that the rolling, or transverse motion, is of all others, the most disagreeable to passengers and the most straining to the vessel of any other, and this is always, among marine architects of distinction, the one above all others to be cared for; the pitching or violence of the longitudinal motion may be relieved in some measure by increasing or reducing the momentum of the sail; but the practical stability or transverse motion of the vessel, commonly called rolling, is consequent entirely upon shape. It requires but a glance at the body plan of this vessel to discover that if she were intended for rolling, and that only, she could hardly be improved.

In reference to her longitudinal motion many have supposed that, because she was the longest, as a consequence she must be the sharpest vessel, and would thus be relieved from pitching—inasmuch as it is just now beginning to be learned that pitching is consequent upon fullness at the ends of a vessel; but we say that the Great Eastern is not a sharp vessel, her size and dimensions considered; as the curve of solid of displacement will show, she is not as sharp as vessels of one third of her length, an example of which we also furnish. Every vessel, while depending upon the water for support, is subject to be influenced by the water, and in proportion as the size of the vessel is increased, so may we expect that the angle formed by the line of flotation on the water and that on the ship will be reduced, provided that the laws of buoyancy in all other respects have not been disregarded. It is by this reduction of longitudinal motion that the projectors of the Great Eastern have expected to overcome some of the difficulties in crossing the ocean, by thus shortening the distance, inasmuch as the course would be more direct and not subject to the increased length of voyage, as measured by ordinary vessels, over the rugged surface of the wave. It is true that there will be some gain in this particular, but this will be small compared with its great cost. It must not be supposed that 700 or even 1,000 feet of length will overcome the longitudinal motion engendered by the ocean waves, unless the draught of water is reduced in the ration of the increase of length. Now it is plain to every discerning, engineering mind that though a vessel may be what is commonly called sharp on the parallels of flotation, or on what is usually called water-lines, yet the fullness increases as the depth increases; it is the volume of water which is to act on the ends of the vessel, and not the angle which is to be considered. Now it matters not how sharp the load line of a vessel may be, if we continue undermining that sharpness by increasing the number of water lines below, we may make the model in volume, in effect, to equal the fullest of vessels. So we say of the Great Eastern, that while she has a tolerably easy load-line of flotation, yet there are so many feet below, that in computing the volume of water displaced by the bow, we have the end of a full vessel on 700 feet of length. Now if 20 feet of the depth of this vessel were taken off from above, would the vessel not have the same bottom as before? Undoubtedly she would; and is not the 20 feet of excess of depth a very considerable portion of her cargo, to be carried at the greatest cost, and without profit? because it must be carried by the bottom at the expense of keeping out an equal amount of w[illegible]ht in something else that would be profitable—fuel, for example. We [illegible]o means of knowing the weight, (and none but the projectors h[illegible] of the upper portion of this vessel, with all its appurtena[illegible]ave no hesitancy in saying that its equivalent i[illegible]ould, [illegible]anagement.

enable her to make the round voyage across the Atlantic and back on her trial trip. It will be remembered that the directors of the Company owning this vessel claim to have avoided the chief difficulty in steam vessels, viz: that of capacity to carry coals, and at the same time to have a vessel surpassing all others in speed without the proportionate increase of power to obtain it. Upon the same principle, will our transatlantic friends tell us how large, or how long and deep a vessel must be, in order to be able to double the Great Eastern's speed, and reduce the power to 0? We submit to the judgment of the mechanical or engineering reader if such is not the illogical reasoning of the directors, in their report of 1853.

"In thus determining the size of the ships, your directors believe that they are also obtaining the elements of a speed heretofore unknown; and if hereafter coals applicable to the purposes of steam can be supplied from the mines of Australia, the carrying capacity both for cargo and passengers will be proportionately increased. The great length of these ships will undoubtedly, according to all present experience, enable them to pass through the water at a velocity of at least fifteen knots an hour, with a smaller power, in proportion to their tonnage, than ordinary vessels now require to make ten knots. Speed is, in fact, another result of great size. It is believed that by this speed, combined with the absence of stoppages, the voyage *between England and India*, by the Cape, will be reduced to from thirty to thirty-three days, and between England and Australia to thirty-three or thirty-six days."

Was there ever a more fallacious dogma launched upon the commercial world, in any age or by any people? If the reader will but refer to the article on "The influence of Model," &c., page 382 of the present volume, he will be the better able to appreciate our remarks. We submit the problem to the common sense of the mechanical portion of the commercial world, whether, in the history of the past, speed was ever increased on a vessel by increasing her draught of water. And this is what the Great Eastern Steamship Company are endeavoring to do in their zeal for large vessels. *It is the form, and not the bulk*, which gives character to every vessel for efficiency. The smallest vessel represented on the accompanying engraving could steam around the Great Eastern in open sea, during the fiercest gale, in a single dog-watch, and in smooth water, twice within the same length of time. It is not against the great size of the Great Eastern that we demur, but against her form and the more prominent features which gave rise to that form, that we raise our voice. The world must learn by experience, if in no other way, that great size in vessels furnishes no assurance that great profit or speed will follow.

But we have only examined the subject under the light of mechanical science, with the firm conviction that if the enterprise is mechanically wrong, commercial and financial skill cannot make it profitable. It is indeed a strange coincidence, that of the vast amount which has been written about the Great Eastern, no one has ventured to challenge the feasibility of the enterprise, by the laws of mechanics or the light of science, as applied to nautical mechanism. When these tests shall have been applied, the Company will find that the "tubular bridge principle" is not exactly adapted to the laws of buoyancy, as developed in nautical construction. We submit that if we can demonstrate this vessel to be wrong in principle, with reference to her shape, then the fine-spun theories of large profits may by possibility rest on no better foundation than the theory of her model. With regard to the strength of this vessel, it is doubtless commensurate with her weight, and this is all that can be said of any vessel in this particular.

But there is another point in which the traveller may be interested: it has been supposed that inasmuch as this ship's decks would be so high above water, that they would be entirely free from the moistening influences of the wave. This is a mistake. It must not be assumed that because the altitude of the ocean wave does not exceed twenty-eight feet, that therefore, when we place the deck or rail of a vessel above twenty-eight feet, we are secure from the borders of Neptune. Those passengers who have crossed the ocean in the Cunard and Collins steamers know better; some of these vessels have their bow full twenty-eight feet above water, and yet such has been the weight of water which has fallen on deck from a single wave that it was thought that the beams of the ship were broken. It may be said that inasmuch as this ship is of so much greater length she will not be subjected to the gravitating influence at the bow, which gave impulse to the surge and increased the momentum both of the ship and the wave; her great length, it is thought, will enable her to secure a mean line of emersion amid the foaming billows, from which position she will not be jostled by the frowning elements. We differ widely from those who think that the Great Eastern will be a dry ship because of her height above water; because, excessive height above water is but the index of great depth below, and were there is great draught of water there is a commensnrate subjection to the influencing preponderance. Where there is no ballancing hydraulic pressure beneath the surface to counteract the force above, the wave rises higher in order to secure that ballance. In order to understand this, let the reader take refuge in the Eddystone light house during a storm, or take a positio[illegible] water-logged vessel at sea, or on board a wreck upon th[illegible] will find himself insecure against the foaming billows, th[illegible]

feet above the surface, and at half-mast height. So will it be with the Great Eastern; her great height above water is prevented from being serviceable as a barrier against the boarding wave by the excessive depth below water. When the transferred wave motion is communicated to the volume in which she is immersed, the ballancing volume is intercepted, and the counterpoise can only be formed by an increased elevation above that required by the opposite wave which the vessel has intercepted. When nature is interrupted in her own course, the next best is substituted. When, by the laws of buoyancy, a ballancing volume for the wave, whose motion is in the direction of the wind, is sought in the adjacent element, still further to leeward, it must be had, or the unballanced wave is broken in its momentive force against the vessel, and having acquired motion, its force is accelerated by the power of the wind, added to its gravitating momentive power, comparatively unresisted in the atmosphere. Vessels of moderate draught of water are relieved from this inconvenience when in other respects they conform to the established laws of equilibrium. If the Great Eastern were of suitable proportions in reference to depth, her draught of water would not exceed twenty feet at the utmost; and we know of no reason why, with the advantages of size she possesses, 18 feet would not be the best altitude for the line of flotation.

In order to bring this ship to a successful standard of speed, comfort and profit, she shonld have more bottom and less topside; in order to obtain these in due proportion, our figures—for the length she now enjoys, at least 100 feet of breadth, with at least 20 feet of a reduction of depth; and then she should have more lifting power on her anterior part with finer lines. The Ocean Bird has much finer lines than the Great Eastern, a mere launch, or jolly-boat to this leviathan of the deep. It will be observed that so far from proposing a reduction of the size of this vessel, now that she is built, we propose increasing it;—so far from reducing her carrying capacity for cargo we propose enlarging it; in other words we propose more cargo and less ship, by converting part of the weight now in the ship into cargo.

But we may be told that the Great Eastern is as sharp as she can be—that no vessel can be made sharper—her water-lines are as fine as they can be, etc. Hold, reader! pause one moment. Supposing that she is as sharp as you imagine, *would not a great number of sharp water-lines, laid side by side make one full water-line?* You answer, very wisely, yes, that it would. And now we ask again, would there be any difference in the resistance of this full water-line, (assuming that it has some imaginable thickness), whether it be propelled at the surface flatwise, or beneath

the surface, edgewise? You say that the resistance would be the greatest beneath the surface, edgewise—and you are right.

The reader will now have discovered the principal point in our objection to heavy draught of water; it is the volume of vessel which is increased, and not so much the angle of a line at the surface, by which the vessel is defined to be sharp or full by Marine Architects. Many persons assume that because a vessel has a heavy draught of water, she must be sharp—that only sharp vessels draw heavy draught. We say no; it is not unfrequently the case that vessels which are supposed to be the sharpest are in reality among the fullest, chiefly because of the increased draught of water consequent upon this misnamed sharpness. An inch board of 12 feet length, even though propelled through the water edgewise, presents one square foot of surface. Now it makes a material difference whether this board is drawn through the water flatwise, when in the position nature demands, submerged with the surface parallel to that of the water, or whether it is kept in a vertical position, at right angles with the surface, and drawn edgewise through the water. The resistance would be increased, as every intelligent reader knows, by securing the artificial in preference to the natural position. Hence we say in reference to the Great Eastern, the volume of water to be moved is very great, even at the finest part of the bow; and when we contemplate the resistance of floating bodies, (not as Col. Beaufoy did) it is the volume we must compute, and not the area of surface. We can readily conceive how such an egregious blunder was made in the Great Eastern's model; the computation was made by an engineer instead of an architect. Engineers always compute the area of the midship section of a vessel in order to determine the amount of resistance to be overcome, and the amount of power required. This is one of the greatest humbugs of this enlightened and mechanical age. We should as soon think of measuring a man's foot for the size of his hat, as to think of determining the resistance of a vessel by the area of her immersed midship section.

But in reference to the Great Eastern in a strictly commercial sense. The directors tell the Company of the carrying capacity and accommodations:—

"Each of the Company's ships will carry, besides their own coals, upwards of 5,000 tons measurement of merchandise, and will have accommodations for 800 cabin-passengers of the highest class, with ample troops and lower class passengers. These you will not only carry at rates much smaller than those by any existing stean with an unprecedented amount of room, comfort and convenie

We would in all candor enquire whether the directors have considered that there is more than one port in Australia, and that no one port can furnish a sufficient amount of trade to furnish freights for their ship. Do the Directors know that there is an Adelaide, a Geelong, Hobart Town, Launceston, Melbourne, New Zealand, Fort Philip, Portland Bay, Sydney, Swan River, and Victoria Colonies? Have they so far secured the friendship of the merchants of those colonies, towns, and cities, as to induce them to send their goods by the Great Eastern and then re-ship them in some vessel of *more moderate draught of water*, to their place of destination? Or will those merchants, in the absence of the desired vessel of lighter draught, have their goods landed, and take the overland route to their place of destination? Clever men, these merchants—our readers no doubt will say--to increase the cost and handling of their goods for the benefit of the Company. Perhaps the goods will command a better price by being shipped by the Great Eastern. The people of Australia will, no doubt, subject themselves to those little inconveniences for the Company's benefit. Do the directors think so? We, however, think otherwise. As it regards the passengers they might be induced to take passage in this vessel, provided they were not kept waiting too long—not for her to take in her cargo, but for her to get it; for 5,000 tons of freight is more than would be readily secured. A vessel of more moderate pretensions could fill up with 500 tons, and make at least one half of the voyage before the Great Eastern would be full.

The Directors farther inform the Company that she has accommodations for 800 first class passengers, and "ample space for lower class passengers." Now if the Directors have not learned the financial results of carrying accommodations for more passengers than can be obtained the year through they might have secured the information from the Cunard or Collins line. Perhaps the Directors will fill their state-rooms with passengers in the same manner that they fill their ship's hold with freight, viz: by waiting for the ship to get full, and thus pay for the privilege of sailing in the Great Eastern. But the inconveniences of handling freight so frequently must be a serious objection in the minds of shippers by this vessel; the ship must lie in the stream and both receive and discharge her cargo. Doubtless the Directors have considered all these drawbacks on their large profits, but as we do not find them in their reports, we have noted them, lest they should be overlooked.

SCIENCE AND ARCTIC VOYAGES.

The explorations of the northern coasts of America in search of a northern, or, as it is generally termed in Great Britain, a "Northwest Passage" to the Pacific have been pretty effectually discontinued. If there is an open sea extending over the parts yet unreached, there may, at some future period, be inducements to explore it, but at present the voyage round the almost equally dreary "Horn," sailing or steam-towing through the rocky Straits of Magellan, a canal along some line between the northern and southern continents, the Panama Railroad, Pacific Railroad, and Pacific wagon road; some or all of these seem far more practicable, profitable, and in every sense more desirable, than attempts to crush a passage through ice floes in the Arctic Ocean. The search for Sir John Franklin's party—commenced this year by a small propeller from England, the sides of which are *very flaring, to induce the vessel to rise when pinched in the ice*—is probably the last which will be undertaken, even if the hope to find important traces or even records of the lost explorers should be fully realized.

But it is none the less true that the explorations of the last ten years have added to the wealth of the world by furnishing important scientific information. In regard to its small amount, as compared to the cost of its acquirement, we would protest, in the language of a recent writer in the *Massachusetts Teacher*, against looking at knowledge from a mere *commercial* point of view. We ignore, entirely, the price current that shall give us, in dollars and cents, the market value of the discovery of the circulation of the blood, or the binomial theorem; the magnetic telegraph, or the laws of the trade-winds; the sources of the Niger, the cotton gin, or the steam engine. Such views are unworthy of an age of intelligence. Knowledge has other uses besides that of supplying the wants of the body, and its mission is infinitely higher than the gratification of a sordid love of money.

Within the last forty years a coast line of more than four thousand miles, in those regions, has been examined and accurately laid down upon navigators' charts; and to this we may now add that examined by the recent expedition of the late Dr. Kane, the results of which expedition are very considerable, and especially valuable for their accuracy and correctness. In North Greenland and the vicinity of Smith's Sound, nearly one hundred localities, such as capes, mountains, islands, bays, &c., were visited and determined with the utmost precision. Northern British America has been thoroughly explored, and nearly every feature of the country and climate, between the Great Lakes and the Frozen Ocean, has been carefully noted by keen observers. The Northwest Passage, that problem of ages, long and painfully sought for, has been tolerably well proved to exist.

Terrestrial magnetism and the variation of the magnetic needle; astronomical observations and experiments with the pendulum for ascertaining the true form of the earth; ocean soundings and the freezing of salt water; records of the weather and the course of atmospheric circulation, are subjects which have received much attention. Two expeditions alone, some years since, gave us a knowledge of more than twenty families of plants of the natural order. Unaccustomed as we are to associate vegetation with the ice-bound North, it is nevertheless true that the botany of Greenland enumerates more than two-hundred and sixty species.

The discovery of a stinted shrub or an unknown moss, in Spitzbergen or North Greenland, or the examination of a limestone cliff on the shores of Coronation Gulf, may, as isolated facts, be unimportant; but in the hands of the botanist and the geologist they may supply a vacancy in classification, or throw additional light upon the conditions of vegetable existence and the structure of the earth, of inestimable value. In these days of pomological and horticultural conventions, scientific agriculture, and universal Chinese sugar cane *furore*, we need use no special pleading to convince the reader of the importance of extending our investigations in the sciences of botany and geology, theoretical and practical.

England, through her Board of Admiralty, has recently discarded her own charts of Baffin's Sea and adjacent waters, and adopted instead, those prepared from the observations of the late Dr. Kane—a graceful tribute to their accuracy, and a fitting acknowledgment of the importance of this kind of information.

By reading the account of Dr. Kane's expedition, every person who has to encounter the severity of even a New England winter, will be furnished with a better knowledge of the powers and requisites of his system to meet and to withstand, successfully, the hostile elements and vicissitudes of climate to which he is inevitably exposed. The experience of Dr. Kane and his companions in subsisting upon scurvy grass and the coarse meat of the walrus and seal, is worth more to the physiologist than a volume of mere theories upon animal heat. Indeed, every person, unwittingly it may be, becomes a sharer in the common good derived from the explorations which are now apparently so unsuccessfully being terminated.—*Scien. Am.*

THE LAST YACHT REGATTA.

On Board Yacht Silvie,
New-Bedford Harbor, Aug. 14, 1857.

Sir:—The joint committee appointed by the New-York Yacht Club and the citizens of New-Bedford to conduct a regatta in this harbor, on the 13th inst., respectfully report that there were twenty-six entries of yachts, of which number five were of the third class, fifteen of the second, and six of the first. Of all these the yachts of the first class were alone placed at the termination of the race. The times of starting, together with that of their turning the stake boats and arrival, are as follows:—

FIRST CLASS STARTED AT 11 H., 39 M., 5 S.

Yachts.	Tons.	Stake Boats.	Time. H. M. S.
Schr. Haze, Grinnell	87	First	12..41..00
		Second	2..28..50
		Third	4..40..58
Schr. Sylvie, Stebbins	105	First	12..41..35
		Second	2..29. 09
		Third	4..40..16
Schr. Juliet, Palmer	86	First	12..44..00
		Second	2..37 .00
		Third	4..54..25
Schr. Restless, Thatcher	86	First	12..46..00
		Second	—
		Third	4..56..34
Schr. Favorita, Kingsland,	135	First	12..48..15
		Second	—
		Third	4..56..03
Schr. Widgeon, Edgar	101	First	—
		Second	—
		Third	5..01..09

The Widgeon and Favorita set their main gaff top-sails, the areas of which are for the former 223.22 square feet, equal to three minutes 45 seconds, and for the latter 321.52 square feet, equal to 5 minutes and 22 seconds. The allowance of start being deducted from the time of sailing in the following tables show the order of speed of each yacht:—

Yacht.	Area of Canvass. sq. ft.	Extra Canvass. sq. ft.	Allowance of Start. M. S.	Net Time. H. M. S.	Order of Speed.
Haze	3.936.10	——	10..32	5..12..25	1
Juliet	3,303.07	——	— —	5..15..20	2
Sylvie	4,204.05	——	15..00	5..16..11	3
Restless	3,555.56	——	4..12	5..21..41	4
Widgeon	3,413.06	223.7	5..34	5..27..38	5
Favorita	5,013.07	321.52	33..52	5..50..50	6

The prizes of this class are consequently awarded to the Haze and Juliet.

Regarding the yachts of the other classes, which were not placed by the Committee, it is proper to state that the yachts of the third class did not start when the signal gun was fired, which circumstance was construed by this committee as a concession on the part of the commanders of these yachts that the weather was altogether too thick for them to attempt to make their courses. Soon after this, the weather, both in force of wind and obscurity increased to such an extent that the Committee deemed it impracticable for any of the yachts to keep their courses; it was therefore decided to postpone the regatta to another day, and the yachts of the third and second classes were advised that there would be no race. Shortly after this, a favorable change in the weather occurred, which induced the Committee to attempt a second start, and upon their reaching the time of the third class, it appeared that the Island Fawn, Rowena, and Una had left their positions, and although the remaining yachts of the third and second classes were started and run the course, yet in consequence of the above named yachts having been permitted to leave their positions, it was impracticable to consider the course of the other yachts a race, without the presence of all who were entitled to compete for the prizes.

The wind was from the southward, and from the time of starting until 3, P. M., was very fresh, accompanied with mist and rain.

Herewith is a copy of the sailing directions, as published by the Committee. Very respectfully,

Chas. H. Haswell,
J. Howard Wainwright,
J. C. Dolavo,
Thomas Eve, Jr.,
Joseph Richetson, Jr.,
} *Committee.*

To Wm. Edgar, *Commodore of New-York Yacht Club.*

It is to be regretted that a more practical and scientific mode of determining the sailing qualities of yachts were not adopted by the Club. Displacement is the only rational standard. This determines the *weight*, *bulk*, and *specific gravity* of the vessel, leaving the question of model free and untrammeled. A change in the rules of yachting, such as we have proposed, would be a positive benefit to the commercial world, by furnishing miniature models of vessels adapted to practical utility.

TREASURY CIRCULAR UNDER THE TARIFF OF 1857.

The Treasury Department has furnished the subjoined Circular of general regulations under the revenue and collection laws of the United States, including the tariff act of March 3d, 1857.

"Treasury Department, April 15, 1857.

In performance of the duty imposed by law on this Department, of superintending the collection of public revenue, the attention of collectors and other officers of the customs is called to the provisions of the several acts of Congress levying duties on imports, which will be in force on and after the first day of July next.

The tariff act of 30th July, 1846, having been modified by the act of the 3d March, 1857, 'reducing the duties on imports, and for other purposes,' the provisions of the last-mentioned act are hereto subjoined, to which is added a tariff of duties as amended, arranged in schedules, under the provisions of the act of the 3d March, 1857, applied to the act of 30th July, 1846; and, for more convenient reference, there is also subjoined a comprehensive list, alphabetically arranged, of all the designated articles expressly made liable to duty, or exempted therefrom, with their respective schedules and rates of duty, when dutiable, indicated thereon.

As the change in the law regulating the rates of duty by the act of the 3d of March last, disturbs but to a slight extent the classification of imports made by the tariff act of the 30th July, 1846, and is confined principally to a change in the rates of duty, the construction heretofore given by this Department to that act is still in force and applicable, except where that law has been modified by the act of 3d of March last. Collectors of the customs will find decisions of the Department, in various cases presented under the act of 1846, embodied in general regulations issued by the Department on the 1st of February last.

It will be born in mind, that the provisions of the 20th section of the tariff act of the 30th of August, 1842, a copy of which is subjoined, are still in force, and furnish a rule of construction to be applied to articles not specially designated in the several schedules of the act of 3d of March, 1857. These provisions, properly applied, will aid the officers of the customs in assigning articles of import, not designated in terms in the tariff, to the schedule to which they are to be regarded as belonging, in reference to their liability to duty.

All other enumerated articles, not so susceptible of classification, will be liable to the duty of 15 per centum, as prescribed in the first section of the act of 3d of March, 1857.

By the fourth section of the said act it is provided, that all goods, wares, and merchandise which shall be in the public stores on the first of July next shall be subject, on entry thereof for consumption, to no other duty than if the same had been imported, respectively, after that day. Merchandise, therefore, in public store on the first day of July next, or in bond under the warehousing laws, whether deposited in any warehouse authorized by law, or passing in transitu, under bond, from one part of the United States to another, will, irrespective of the date of their original importation or bonding, be subject, on withdrawal for consumption, to the rates of duty prescribed by the act of 3d March, 1857.

It has been represented to the Department that, under the designation of 'galvanized tin plates or sheets,' there have been attempts to introduce sheet iron, covered with a thin coating of tin, the purpose being to pass the iron through the custom-house at a lower rate of duty as a galvanized tin. The attention of collectors and appraisers is specially directed to this subject, and they will, on the entry of all articles purporting to be tin plates or sheets, galvanized or not, carefully inspect the articles, and admit nothing as tin plates or sheets that were not clearly known as such in commercial parlance at the passage of the tariff act of 1846. Where plates or sheets of iron or metal are attempted to be introduced in evasion of the law, under a false designation, the proper proceedings will at once be instituted to enforce the forfeitures and penalties provided by law; and in all cases where no fraudulent attempt is manifested, the duty to which the articles, according to their true character, are liable under existing laws, must be levied and collected.

A question has recently been presented to the Department, in regard to the exemption from duty of certain articles claimed to be 'paintings,' and as such falling within schedule I of the tariff. It is decided by the Department that the 'painting' referred to in that schedule as entitled to free entry, must be an object of taste, recognised as a painting in the usual acceptation of the term; and that paintings on glass, specially provided for in schedule C, on porcelains, alabaster, china, marble, plaster, or similar materials; on plates, goblets, vases, or any other utensil, or paintings capable of being converted into breastpins, eardrops, or other ornaments to be worn on the person, are not entitled to free entry under the law.

In schedule I, it will be seen, there is a provision for the admission free of duty of sheep's wool, unmanufactured, of the value of twenty cents per pound, or less, at the port of exportation. The question has been submitted whether, in estimating the value in such case at th of exportation, the expenses of packing, commissions, and other ncident to the shipment of articles for exportation, are to be inclu

The value referred to in this provision of the law, is t market

value or price at which the article in question could be generally purchased per pound, and does not include the charges and expenses mentioned, or other charges incurred in the mere shipment or preparation for shipment after purchase.

Commissions and shipping charges are, however, under the laws levying duties on imports, to be added to the foreign market value of imports, as a part of the value on which duties are to be assessed on entry in ports of the United States; but they constitute no part of the value in the foreign market as referred to.

In regard to the fifth section of the act of the 3d March, 1857, providing for an appeal to this Department from the decision of the collector as to the rates of duty to which imports are to be subjected, collectors are instructed, that whenever such appeals are taken, they are to forward at once to the Department a report of their decision, and the grounds upon which it was based, together with a report in full on the subject from the appraisers, if any, at the port, accompanied by samples, if deemed necessary, to afford a clear understanding of the matter in controversy between the importer and the custom authorities.

As connected with the operation of the tariff laws now in force, the attention of collectors and other officers of the customs is called to the subjoined Acts of Congress, approved the 2d and 3d ult., amendatory of the 28th section of the tariff act of 30th August, 1842, and the 8th section of the tariff act of 30th of July, 1846, and which went into effect at the several dates of their approval.

In the act first mentioned it will be perceived that the prohibition of the importation of certain articles is made so comprehensive as to embrace descriptions of imports not affected by the law as it originally stood, but whose importation, nevertheless, was believed to be within the principles of that enactment. The amended act is precise and definite in its terms, and obviates all doubt as to its scope and intent.

The act amending the 8th section of the tariff act of 30th July, 1846, it will be seen, makes no change in existing laws, as construed by the Department, except to place dutiable imports, however procured, by purchase or otherwise, on the same footing as to the privilege of adding in the entry to the cost or value given in the invoice, and their liability to additional duty for undervaluation.

HOWELL COBB, Secretary of the Treasury."

THE OCEAN MAIL STEAMERS OF GREAT BRITAIN.

Having in the present volume published a list of the Mail Steamers of the United States, we deem it quite proper to furnish a similar table of those of Great Britain. We copy the following article with the list from the *New-York Herald.* The numbers 1 to 15 will point out the different lines in the recapitulation at the close.

"It is a table of great interest and value, prepared entirely from official reports. It is a complete key to the commercial supremacy of the British Empire, and shows conclusively how John Bull carries off trade where no one else would think of looking for it. The ocean mail service of the kingdom comprises 15 different lines, a fleet of 121 steamships, with an aggregate tonnage of 141,293 tons, propelled by engines measured by the strength of 42,534 horses, and managed by officers and crews numbering 8,205 men. This service is carried on at a cost to the nation of $5,114,700, of which about three-fifths is returned in postage. The four lines requiring the heaviest subsidies are those to the West Indies, Mexico and South America, to the Mediterranean and the East, to Australia and to the United States. The annual compensation for these lines amounts to $4,502,450, an average of more than a million dollars to each. The five domestic lines, to Shetland and Orkney, the Channel Islands, Isle of Man, and Ireland—require but $161,750, and the line from Dover to Calais and Ostend, $77,500. Two of the lines have neither terminus in the United Kingdom—one running from Halifax to Bermuda and St. Thomas, and the other on the west coast of South America, from Panama to Callao and Valparaiso. These require the inconsiderable sum of $198,500. The three remaining lines run to Spain, Portugal and Gibraltar, to the West Coast of Africa and the islands adjacent, and to the Cape of Good Hope, Mauritius and Calcutta. These have an annual compensation of $413,750. Omitting the domestic service in and about the British Isles, and from Dover to Calais and Ostend, the aggregate length of the nine long lines is not far from 45,000 miles, and over these there is an aggregate number of eighteen trips a month.

The rise and progress of the ocean steam mail service of Great Britain is second in interest to no chapter in the maritime history of the world. The first contract for carrying mails by sea in steamers was made by the Postmaster General in 1833, and provided for a semi-weekly service f Liverpool to the Isle of Man, in steamers of not less than 140 tons b at £850 a year. That contract, with the same Company—the M Steam Company—on exactly the same terms, has continued to thi period of twenty-four years, a circumstance unexampled in the l

steam navigation. The next ocean steam mail contract was made with the General Steam Navigation Company, in 1834, for conveying the mails from London to Rotterdam and Hamburg twice a week, for £17,000 per annum. The contract was renewed in 1849, and annulled in 1853, the mails being sent to Ostend, and thence by rail through Belgium. The third contract for steam mail service, and the first for a long voyage over sea, was made in 1837, with Richard Bourne, for the conveyance of the mails weekly from Falmouth to Vigo, Oporto, Lisbon, Cadiz and Gibraltar, for £29,600 a year. That contract was transferred in 1843 to the Peninsular and Oriental Steam Navigation Company, Southampton substituted for Falmouth, the trips altered to three a month, and the compensation reduced to £20,500, and on these terms it remains to this day. The Aberdeen and Shetland contract was made in 1838, for weekly service, at £600 a year. It was given up in ten months, and the present contract made in 1840 at £900 a year.

Now commences the great struggle for the supremacy of the Atlantic, and this forms the second era in the history of ocean steam navigation. The first successful attempt to cross the Atlantic by steam was performed by the American steamship Savannah, which left the city of Savannah on the 25th of May, 1819, and arrived safely in Liverpool in twenty-two days, having been under steam in all fourteen days. This vessel, built in New-York by American mechanics, without any former success or precedent to guide them, it must be admitted achieved a success quite equal, all things considered, to the boasted performances of the Baltic, the Persia, or the Vanderbilt. In size, as compared to a modern Clyde or New-York built steamship, it was like a sparrow by the side of an eagle, being of 350 tons burden, and propelled by engines of 90 horse power. She would now scarce serve as a tender to a modern mail steamer.

Captain Moses Rogers of the steamship Savannah—the Columbus of trans-Atlantic steam navigation—having pointed out the way, the Cork Steamship Company were the first to follow the example, by despatching the Sirius, which arrived in New-York on the 23d of April, 1838. The Great Western Steamship Company, represented by Thos. Kington, Chairman, Robert Bright, Deputy Chairman, and Christopher Claxton, Managing Director, offered to transport the mails from Liverpool or Bristol to Halifax and Boston, twice a month, for £45,000 per annum. They required from eighteen to twenty-four months to build vessels and get them ready, but government would only wait one year. A contract was made with Samuel Cunard, of Nova Scotia, by a singular coincidence, on the 4th day of July, 1839, for a semi-monthly mail service to Halifax and Boston, for £60,000 per annum. That agreement, entered into on the anniversary of American independence, was a step that probably contributed

more towards bringing about an extensive interchange of correspondence, commerce, travel and friendly intercourse between the two nations, than any previous act of the British government since the close of the war of 1812. It was soon found that Boston possessed but few advantages for a steam packet station, and one half of the Cunard vessels were sent direct to New-York, an arrangement that has continued to the present day, notwithstanding we have now a dozen lines of steamers, instead of one, running across the Atlantic. By the favor of the British government, coupled with the fact of its proximity to Halifax and Canada, Boston has continued to be a station for some of the smaller Cunard steamers, though not one single addition has been made to the trans-Atlantic steam service of that port, from any source, since the signing of the above contract, a period of more than eighteen years. These facts speak for themselves. New contracts were signed in 1850 and 1852, the latter providing for weekly service in winter as well as in summer. The contract price was fixed at £173,340, and the engagement is to continue till January 1, 1862, and thenceforward till twelve month's notice is given.

The contract for steam service to Malta, Corfu and Alexandria, was made in 1840, and in 1845 this service was extended to Suez, Bombay, Ceylon, Calcutta and China, and is all carried on by the Peninsular and Oriental Company. The contract for the mail service on the Pacific coast of South America was made in 1845, and renewed in 1850. The steam service to the Channel Islands commenced in 1848. In 1839 the Royal Mail Steam Packet Company offered to carry the mails twice a month to the West Indies for £240,000 a year, but no contract was made till 1850, when it included a separate service once a month to Brazil, by way of Lisbon, Madeira and Teneriffe, at £270,000 per annum. The service to the Cape of Good Hope, Mauritius and Calcutta, by way of the Island of Ascension, commenced in 1852, as also by Madeira and Teneriffe to the West Coast of Africa. A service was also opened during the same year from the Cape to Port Natal, but it seems to have been discontinued. Such is a brief abstract of the ocean mail service of the kingdom of Great Britain to the beginning of the present year. Looking at localities and individual interests, the Company receiving the largest subsidy is the Royal Mail Steam Packet Company, for the service to the West Indies and Brazil—the annual compensation being $1,350,000. This Company has twenty steamers, an aggregate of 29,454 tons. The Peninsular and Oriental Steam Navigation Company have in the service thirty-nine vessels, measuring 48,835 tons. They have contracts (numbered 4 and 5) to Gibraltar, the Mediterranean, India and China, and receive $1,224,000 per annum.

The European and Australian Mail Steam Packet Company made contract for conveying a monthly mail to Australia by way of S

1856, and commenced service in January of the present year. They receive $925,000 per annum. Cunard's two contracts bring him $948,000 a year.

It is instructive to see the ports in Great Britain, from which the most of this steam service emanates, and by a most remarkable coincidence not one solitary vessel of England's vast fleet of mail steamers sails from the port of London. Here is the record for all the long lines:—

Places of departure.	*Lines.*	*Vessels.*	*Tonnage.*	*Men.*	*Trips.*	*Compensation.*
Southampton	4	66	91,699	5,415	9 a month	$3,499,000
Liverpool	1	9	18,406	922	4 a month	866,700
Dartmouth	1	5	8,000	575	1 a month	205,000
Plymouth	1	7	5,951	320	1 a month	106,250
Total	7	87	124,056	7,232	15 a month	$4,676,950

From this it appears that Southampton carries off the lion's share of the ocean mail traffic of the kingdom. Divided as the commerce of the little Island of Great Britain is, among several ports, we see the different important lines concentrating at different points, according to locality, harbor, capital, enterprise or business facilities. With us in the United States it is different. Here New-York combines the unrivalled locality of Southampton, the vast business facilities of Liverpool, and the present and prospective capital, trade and importance of London itself. If any of our neighbors north or south of us are ambitious of seeing their true position in the ocean steam commerce of the Western continent, the figures attached to Plymouth and Dartmouth in the above table will probably afford them some consolation.

Line of Communication, Contractors and Contract Price.	Places Connected.
1. Liverpool and Isle of Man. *Mona Isle Steam Co.* Twice a week. $4,250 per annum.	Liverpool and Douglass, Isle of Man.
2. England and Ireland. *City of Dublin Steam Packet Co.* Twice a day. $125,000 a year.	Holyhead and Kingstown, near Dublin.
3. Scotland and Shetland. *Aberdeen, Leith, and Clyde Shipping Co.* Weekly. $6,000 a year.	Aberdeen, Wick, Kirkwall, (Orkney) and Lerwick, (Shetland.)
4. England, Spain and Gibraltar. *Peninsular and Oriental Steam Navigation Co.* Three times a month. $102,500.	Southampton, Vigo, Oporto, Lisbon, Cadiz and Gibraltar.

5. Mediterranean, India, and China. *Peninsular and Oriental Steam Navigation Co.* Twice a month to India—monthly to China. $1,121,500.	Southampton, Malta, Alexandria, Suez, Aden, Bombay, Calcutta, Singapore, Hong Kong and Shanghae.
6. England and United States. *Sam. Cunard.* Weekly. $866,700.	Liverpool, Halifax, and Boston; and Liverpool and New-York.
7. North America, (Colonial). *Sam. Cunard.* Monthly. $73,500.	Halifax, Newfoundland, Bermuda and St. Thomas.
8. West Indies, Mexico, and South America. *Royal Mail Steam Packet Company.* Semi-monthly to the West Indies and Gulf of Mexico, and monthly to Brazil. $1,830,000.	Southampton, Kingston, (Jamaica,) St. Thomas, Vera Cruz and Aspinwall; Southampton, Lisbon, Madeira, Teneriffe, St. Vincent, Pernambuco, Bahia, Rio Janeiro, Monte Video, Buenos Ayres, and St. Thomas.
9. England, France, and Belgium. *Jenkings and Churchward.* Daily to Calais; thrice a week to Ostend. $77,500.	Dover and Calais. Dover and Ostend.
10. Channel Islands. *Southwestern Railway Co.* Thrice a week. $20,000.	Southampton, Jersey, and Guernsey.
11. West Coast of South America. *Pacific Steam Navigation Co.* Twice a month. $125,000.	Panama, Callao, and Valparaiso. Allowed to touch at Buenaventura; Guayaquil, Payta, Lambayeque, Huanchaco, Santa, Pisco, Islay, Arica, Iquique, Cobija, Copiapo, Huasco and Coquimbo.
12. Scotland and Orkney. *John Stanger, of Stromness.* Daily in summer; every other day in winter. $6,500.	From Scrabster Pier (Thurso) to Stromness (Orkney.)
13. West coast of Africa. *African Steamship Co.* Monthly, $106,250.	Plymouth to Madeira, Teneriffe, Goree, Bathurst, Sierra Leone, Monrovia, Cape Coast Castle, Accra, Whydah, Badagry, Lagos, Bonny, Old Calabar, Cameroon and Fernando Po; omitting Cameroon, Calabar and Bonny on return.
14. South Africa, Mauritius and Calcutta. *Adam Duncan Dundas.* Monthly. $205,000.	Dartmouth to Cape of Good Hope, Mauritius and Calcutta.
15. England and Australia. *The European and Australian Mail Steam Packet Co.* Monthly. $925,000.	Southampton, Marseilles, Malta, Alexandria, Suez, and Sidney.

The following are the names of the steamers in service in each li[illegible] the amount of tonnage, the horse power of each, the draught [illegible] the number of the officers and crew attached to each one, [illegible] could be obtained, the date that each vessel was surveyed [illegible] for the service. Where the date of survey of a v[illegible] placed as near as possible with others surveyed [illegible] sels in each line being arranged in chronological [illegible]

1.—*Liverpool and Isle of Man.*

Name, Class, &c.		*Horse power.*	*Tonnage.*	*Draught of Water.* Ft.	In.	*Crew.*	*Date of Survey.*
King Orry		190	429	0	0	22	Dec. 1845
Tynwald	iron	260	657	8	9	29	Oct. 1846
Benmy Chree		130	295	6	6	18	June, 1847
Mona's Queen	iron	220	508	8	6	22	Mar. 1853
Total, 4 vessels		790	2,089			91	

2.—*England and Ireland.*

Name, Class, &c.		*Horse power.*	*Tonnage.*	Ft.	In.	*Crew.*	*Date of Survey.*
Prince Arthur	iron	220	418	8	8	26	July, 1852
Llewellyn	iron	342	654	9	6	29	Oct., 1852
Eblana	iron	372	685	8	11	31	Jan., 1853
St. Columba	iron	350	650	8	10	29	Sept., 1853
Total, 4 vessels		1,284	2,407			115	

3.—*Scotland and Shetland.*

Name, Class, &c.		*Horse power.*	*Tonnage.*	Ft.	In.	*Crew.*	*Date of Survey.*
Fairy		120	350			18	
Duke of Richmond		180	500			24	
Total, 2 vessels		300	850			42	

4.—*England, Spain and Gibraltar.*

Name, Class, &c.		*Horse power.*	*Tonnage.*	Ft.	In.	*Crew.*	*Date of Survey.*
Sultan	iron	420	1,001	14	0	67	Jan. '53
Madrid	iron	133	448	10	2	40	Feb. '53
Tagus		280	691	14	8	41	Jan. '54
Alhambra		140	642	13	7	52	July '55
Total, 4 vessels		973	2,782			200	

5.—*Mediterranean, India and China.*

Name, Class, &c.		*Horse power.*	*Tonnage.*	Ft.	In.	*Crew.*	*Date of Survey.*
Lady Mary Wood		270	619	0	0	40	Feb. '42
Precursor		520	1,783	18	0	121	July '44
Pekin	iron	415	1 003	14	0	78	Jan. '47
Oriental		420	1,427	13	0	78	March '48
Achilles		430	823	16	0	59	June, '48
Malta	iron	460	1,222	0	0	82	Sept. '48
Hindoostan		500	1,595	16	10	53	July '49
Singapore	iron	465	1,189	12	6	96	March '51
Ganges	"	465	1,189	14	7	69	June, '51
Pottinger	"	450	1,275	17	6	82	Apr. '52
Formosa, sc.	"	177	658	13	6	60	Aug. '52
Chusan, sc.	"	100	765	11	3	45	Aug. '52
Haddington	"	450	1,303	17	7	105	Nov. '52
Vectis		400	900	0	0	51	

Name, Class, &c.		Horse power.	Tonnage.	Draught of Water.		Crew.	Date of Survey.
Shanghae, sc	iron	90	825	0	0	60	
Mantia		60	646	0	0	60	
Bentinck		520	1,973	19	3	83	Nov. '52
Euxine	iron	430	1,071	15	6	72	Jan. '53
Bengal, sc		465	2 185	17	6	115	Feb. '53
Valetta		400	984	12	2	51	July '53
Norma, sc		230	1.040	0	0	80	Nov. '53
Colombo, sc		450	1,808	0	0	118	Dec. '53
Ripon	iron	445	1,400	14	9	94	do.
Douro, sc		230	903	13	3	63	do.
Bombay		280	1,240	0	0	84	
Madras		288	1,217	0	0	82	
Indus	iron	450	1,302	17	9	88	Jan. '54
Candia, sc	iron	450	2,212	18	9	115	June, '54
Nubia		450	2,095	21	0	122	— '55
Pera, sc	iron	450	2,013	19	0	129	Jan. '56
Ava, sc	iron	320	1,372	17	0	94	Feb. '56
Alma, sc	"	450	2,164	20	0	124	March '56
Aden, sc	"	210	507	18	9	40	Aug. '56
Delta, sc		210	985	0	0	64	— '56
Delhi, sc	"	450	2,400	0	0	125	— '56
Total, 35 vessels		12,850	46,053			2,877	

6 —*England and United States.*

Name, Class, &c.	Horse power.	Tonnage.	Draught of Water.		Crew.	Date of Survey.
Cambria	500	1,814	18	3	90	June, '46
Europa	650	1,777	15	6	88	July '48
Canada	680	1,774	19	6	88	Nov. '48
Niagara	630	1,774	19	6	88	Dec. '49
America	630	1,729	15	3	86	Jan. '50
Asia	800	2,073	19	0	105	May, '50
Africa	800	2,050	0	0	105	Oct. '50
Arabia	870	2,328	16	7	105	Dec. '52
Persia	858	3,587	21	0	165	Feb. '56
Total, 9 vessels	6,418	18.406			922	

7.—*North America (Colonial).*

Name, Class, &c.		Horse power.	Tonnage.	Draught of Water.		Crew.	Date of Survey.
Osprey		80	354	12	8	21	July '48
Merlin		120	451	0	[illegible]	[illegible]	[illegible] '50
Levantine	iron	80	350	[illegible]	[illegible]	[illegible]	[illegible] '51
Petrel, sc	"	180	700	[illegible]	[illegible]	[illegible]	[illegible] '52
Lady Seymour		120	450	[illegible]	[illegible]	[illegible]	[illegible] '53
Total, 5 vessels		580	2,305				

8.—*West Indies, Mexico and South America.*

Name, Class, &c.		*Horse power.*	*Tonnage.*	*Draught of Water.* *Ft.*	*In.*	*Crew.*	*Date of Survey.*
Dee		410	1,269	18	0	87	May, '46
Trent		450	1,293	17	7	87	Apr. '48
Eagle		263	496	11	10	57	July '49
Derwent		280	708	15	0	66	July '50
Magdalena		760	2,250	19	0	108	May. '52
Medway		420	1,805	17	6	72	May '52
La Plata		939	2,404	21	10	114	Aug. '52
Conway		270	827	12	10	55	Sept. '52
Orinoco		800	2,245	20	11	108	Oct. '52
Avon		450	2,069	17	0	94	May '53
Teviot		450	1,258	18	1	97	Apr. '53
Parana		800	2,222	21	2	120	May '53
Clyde		430	1,335	19	1	87	June, '53
Thames		413	1,285	18	3	72	Aug. '53
Solent		420	1,805	14	11	88	Oct. '53
Camilia	iron	213	640	9	0	34	Oct. '53
Wye, sch.	"	180	818	14	0	45	Feb. '54
Atrato	"	758	2,906	20	6	127	March '54
Tamar		400	1,873	18	7	93	June, '54
Prince		200	446	8	8	35	July '54
Total, 20 vessels		9,306	29,454			1,667	

9.—*England, France and Belgium.*

Alliance		120	300	7	3	16	
Vivid		120	300	7	0	16	
Violet		120	300	7	0	16	
Empress		100	308	6	6	16	
Queen		100	307	6	6	16	
Ondine		80	250	6	0	16	
Total, 6 vessels		640	1,765			96	

10.—*Channel Islands.*

Atlanta		120	240	8	4	21	Oct. '46
Wonder	iron	150	449	0	0	22	Feb. '53
Courier	"	184	440	7	0	18	Apl. '53
Dispatch	"	183	443	7	6	22	Aug. '53
Express	"	160	380	7	4	24	Nov. '53
Total, 5 vessels		797	1,852			107	

11.—*West Coast of South America.*

New Granada	iron	210	600	13	10	41	Nov. '46
Bolivia	"	252	705	0	0	41	Oct. '49
Santiago	"	370	549	13	4	55	Aug. '51
Lima	"	370	1,122	10	8	55	Nov. '51
Bogota	"	394	1,122	13	6	61	Apr. '52

Name, Class, &c.		Horse power.	Tonnage.	Draught of Water.		Crew.	Date of Survey.
Valdivia	"	480	783	13 *ft.*	2 *in.*	41	Nov. '58
Valparaiso	"	320	839	13	6	84	
Total, 7 vessels		2,396	5,719			377	

12.—*Scotland and Orkney.*

Unknown	60	250	6	0	16

13.—*West Coast of Africa.*

Hope	iron	120	838	15	0	46
Charity	"	120	1,007	15	6	52
Ethiope		120	674	0	0	42
Candace		120	900	0	0	46
Retriever		120	900	0	0	46
Niger		120	600	0	0	46
Gambia		130	637	14	0	42
Total, 7 vessels		850	5,951			320

14.—*South America, Mauritius and Calcutta.*

Five screw steamers, Total, 5 vessels	2,000	8,000	570

15.—*England and Australia.*

Oneida	400	1,600	15	6	84
Semla	630	2,510	17	2	88
European	530	2,200	18	9	115
Columbian	530	2,300	17	6	120
(Unknown)	400	1,600	0	0	88
(Unknown)	400	1,600	0	0	88
(Unknown)	400	1,600	0	0	88
Total, 7 vessels	3,290	13,410			671

RECAPITULATION.

Lines.	No. of steamers.	Horse-pwr.	Tonnage.	No. of Men	Service commenced.	How often.	Annual computation.
1	4	790	2,089	91	1833	2 a week	$4,250
2	4	1,284	2,408	115	1850	2 a day	125,000
3	2	300	850	42	1840	1 a week	6,000
4	4	973	2,782	200	1852	3 a month	102,500
5	35	12,850	46,053	2,877	1858	2 a month	1,121,500
6	9	6 418	18,406	922	1856	1 a week	866,700
7	5	580	2,305	128	1854	1 a month	78,500
8	20	9,308	29,454	1,667	1851	3 a month	1,350,000
9	6	640	1,765	96	1854	1 a day	77,500
10	5	797	1,852	107	1848	3 a week	20,[illegible]
11	7	2 396	5,719	378	1852	2 a month	320[illegible]
12	1	60	250	16	1856	1 a day	[illegible]
13	7	850	5 951	320	1852	1 a month	[illegible]
14	5	2,000	8,000	575	1856	1 a month	[illegible]
15	7	3,290	13,410	671	1857	[illegible] a month	[illegible]
Total, 121		42,534	141,298	8,205			[illegible]

ESSAYS ON THE LAW OF SHIPPING.

BY WILLIAM W. BADGER.

No. 3.—The Mutual obligations of the Cargo and the Ship in case of General Average.

Having considered the mutual obligations of the shipping merchant and the shipowner which grow out of the terms of their contract, and the general rules which govern the construction of maratime contracts, including the reciprocal liens on the cargo and the ship, as well as the law of freight, we propose now to notice those obligations and liabilities which arise from fortuitous circumstances, and are generally caused by perils of the sea.

With all the improvements which modern civilization has brought into the art of navigation, and all the comparative safety and expedition which now attend the transportation of goods by water, still the perils of sea-carriage so far exceed those of the land trade, that the law provides certain mutual obligations, which, without any express words or agreement to that effect, attach to all parties embarking their property in a common adventure, that each shall take his proportionate share of the risk, and pay his proportionate share of all losses which arise for the common benefit, whether his own particular goods or those of his co-adventurer be the goods injured or lost.

The conditions and chances of navigation are such as to make it absolutely necessary that there should be unity of interest and of action in the conduct of the voyage, and a common center of discretion and authority from which should issue all directions concerning it. The law has selected the master of the ship as the most proper receptical of this authority, and has given him almost unlimited power over the vessel and the cargo in all situations of extraordinary peril, making him the legal agent and representative of all the parties interested in the voyage, not less of the shipper than of the shipowner, and requiring of him the exercise ot a sound discretion in preserving as far as he can the interests of all concerned.

In the presence of danger his power will increase in exact proportion to the perils and necessities of his situation, until, if the case demand it, he may cast the whole cargo into the sea, for the purpose of preserving the ship, or he may destroy the vessel to preserve the cargo and the lives of the passengers.

So if the master in a foreign port be out of funds, and unable to prose-

cute the voyage for the want of repairs or supplies, he may hypothecate the ship and the cargo, to raise the necessary amount, or he may actually sell part of the cargo to enable him to carry on the remainder; and in all such cases the owners of the cargo will have an implied lien on the ship for indemnity, though there may have been no express hypothecation.

If the ship become at any period unseaworthy, and unable to complete the voyage, it will be the privilege of the master to re-ship the cargo in other vessels, and thus earn his full freight;. but if he sees fit to waive the privilege, preferring rather to lose his freight, it may still be his duty to tranship the cargo, as the agent and legal representative of its owner, and in such cases the owners will be bound to pay all necessary expenses attending such transhipment, and the law will give the master a lien on the cargo for such expenses.

These powers are given to the master by all the maratime codes, and he is expected to do in all emergencies the best thing possible under the circumstances to be done, considering equally the interests of the cargo and the ship, and doing just what the owners of each would themselves do if they were present.

Such absolute powers must of course be accompanied with the greatest responsibility, and the master will not only be held to the strictest integrity and good faith in all his dispositions, but also to the exercise of the soundest discretion and judgment, and he will render himself personally responsible, as much by a blunder as he could by a crime.

But if in their proper exercise, the ship or the cargo or any part of either be voluntarily sacrificed, or in any degree injured for the common benefit or safety, the part saved of each must contribute in proportion to its value, to repair the loss sustainee, provided always that the object for which the sacrifice was made, be attained—as otherwise no benefit has accrued from the loss, and no obligation should therefore attach to repair it.

The earlier writers prescribe certain formalities to be observed in making such a sacrifice—such as a consultation of the officers of the vessel, or a majority vote of the crew, or the presence of certain specified dangers, but none are now considered to be absolutely necessary, except the command of the master, who is presumed to know best when and to what extent a sacrifice should be made, and it is questionable whether even this may not be dispensed with in extreme cases, as the peril may be so great as to justify any one without orders, in throwing into the sea whatever he may first lay his hands on.

The remark of Targa, the venerable Chief Magistrate of Genoa, is known, that, "during sixty years of professional life he had known

cases of *regular* jettison, and all of those were suspected of fraud, from being too formal."

Formality and deliberation seem to be out of place, and not to be expected in such a situation—for the jettison should only be made in case of extreme necessity, in the presence of danger imminent and apalling, when, as is so finely pictured by Juvenal, no pilot's aid prevails.

Nullam prudentia cani
Rectoris conferret opem,

And each one is ready to exclaim with Catullas, "Sacrifice *my* goods, even the most precious"—

Fundite guae mea sunt,
Praecipitare volens pulcherrima.

When any damage or loss occurs which is entitled to a contribution, the law distributes it among all the parties interested in the voyage, without any reference to whose particular goods are lost, and considers them all partners in a joint adventure and bound to bear the loss, each in proportion to the amount of his interest—the whole property—ship and cargo, the lost as well as the saved, formiug a partnership fund from which the loss is to be deducted, the master having a lien on all the property for the amount due from each owner.

Such is the law of general average, and its origin is as venerable as its provisions are politic and just.

It comes down to us unchanged from the earliest period of maratime commerce and seems to bring with it something of the purity and the simplicity of the sacred ages. There is an element of comfort in the very idea of general average. It gives a consciousness of safety that is priceless, and furnishes at the same time a motive to enterprise and a protection to defeat. It is akin to the confidence of faithful friendship, which says, Friend, let us travel together over this pathless desert, that when your strength fails, mine may support you, and when mine shall fail, yours shall bear me onward.

The Rhodian law of jettison is the parent of all the modern enactments, and embodies the whole maratime law of contribution. It is part of a code of laws confessedly the most ancient in Europe. It was early held as the law of nations among the islands of the Aegean Sea, and is thought by many to be nearly of the age of Solomon. It was adopted by the Romans, it is said, nearly three hundred years before Christ, and its high authority among them may be inferred from the celebrated answer of Autoninus, as recorded by Volusius Maecianus.

"Ego guidem mundi dominus, lex autem maris." I indeed am master of the world, but law is master of the sea.

We are indebted to the Romans for all our knowledge of its early history, and one solitary title in the Pandects, (*Lex Rhodia de jactu*,) contains all that remains to us of a once celebrated code. It has doubtless been praised and commented on more than any other part of the maratime law, and writers have very generally expressed their wonder and admiration, that a law so perfect in policy and in justice, should have originated in so early an age.

In the modern application of its principles, great difficulty has been experienced in determining what losses were properly subjects of contribution and what were not, and many items are now allowed in the calculation of the average which were not formerly admitted.

It is now settled that it is the motive for the act in relation to the rest of the property, and not the intention of the jettison in relation to the fate of the thing sacrificed or exposed to danger, which gives rise to the law of contribution so that, if the cargo should be jettisoned and the vessel afterwards be lost, the cargo, though saved, by lighters or otherwise, would not be liable to contribution for the loss of the ship, as its loss would be inevitable, and not voluntarily made for the safety of the cargo.

It seems now generally acknowledged that not only the jettison itself, but all damage arising immediately from or on account of the jettison, either to the ship or to the cargo, as by the falling of a mast or the breaking of casks, is the subject of contribution; and if the vessel be so injured as to be obliged to go into port for repairs, not only the repairs themselves, but the expenses of unlading, storing and relading the cargo, and the wages and provisions of the crew during the detention, are admitted in most of the United States to the benefit of contribution.

The same rule prevails in France and in Holland, but in England a different one is established, and most of the damages above mentioned, are there considered to be too remote to be entitled to contribution.

In like manner, the wages and provisions of the crew during a detention by capture, or by an embargo, have been allowed in contribution in several of the States, but many Courts deny this doctrine, especially in cases of embargo.

Money spent in reclaiming a ship or cargo from capture, or as a ransom to pirates, may be allowed in contribution; but if such expenses do not apply to the whole of the property captured, they will constitute what is termed particular average, and must be borne by the part of the goods for whose benefit they were incurred.

The greatest difference exists in different ports as to what shall [illegible] sidered the contributory value of the ship, freight and cargo, a[illegible] seems to be no uniform or prevailing rule of nations on [illegible]

In France, the whole cargo, and only half the v[illegible]

freight are liable to contribution, and the value of each are to be appraised at the end of the voyage, though formerly the value at the port of departure, was the basis of the calculation.

In Hamburgh the whole value of the ship, cargo and freight is the basis of contribution, and the same is estimated at the port of departure.

In England the contributory values are determined at the end of the voyage, by deducting ship's stores and provisions from the whole value of the vessel, and seamen's wages from the full freight.

The same rule is adopted in most of the United States, though in case of a total loss of a vessel, her value is estimated according to the price at the port of departure, deducting therefrom a proper sum for the wear and tear up to the time of the loss.

In cases of capture, however, a different rule prevails in New York, by which the ship is estimated at four-fifths of her value at the port of departure, the cargo at its first cost or invoice price, and the freight at one-half of the whole freight agreed to be paid; and if a vessel be sold from necessity in a foreign port, the price received for it is taken as its contributory value.

In Massachusetts a still different rule prevails, by which two-thirds of the gross freight is taken as its contributory value, seamen's wages being considered, on an average, as equal to the other third.

II. Voluntary Stranding.

The most perplexing question in the whole history of general average, has been that of a voluntary stranding, followed by a total loss of the ship, but with safety of the cargo. There is scarcely another question in the whole maratime law which has caused such remarkable differences of opinion among judges, and upon which the decisions are more equally divided than they are on the question as to what should contribute to the loss in such cases.

In the United States there have been nine Supreme Court decisions of this question, and five of them grant to the shipowner the right of contribution from the saved cargo for the loss of the ship, and four of equal learning and authority deny it.

The foreign authorities all agree that, *if the vessel be got afloat again*, the damage, whatever it be, which was caused by the voluntary stranding, will be a subject of contribution from whatever was saved, and they all base this opinion on the single passage in the *Lex Rhodia de jactu*, which provides that, there can be no contribution in cases of jettison, unless (*salva nave*,) the vessel be saved.

The *Ordonnance de la Marine* does not notice the case of voluntary stranding at all, but it enumerates in Article 6th, five distinct cases of contribution, and among them is mentioned the expense of getting the ship

afloat after such stranding, and Article 18th adds, that if the ship be broken open, in such case to get out the goods, the damage sustained, however serious it may be, must be a subject of contribution. To this Valin adds in his Commentary, that such damage shall be a subject of contribution, "*if the ship be got afloat again,*" and the same condition is laid down expressly in the modern French code.

Cleirac and Roccus come to the same conclusion as Valin, but Emerigon goes farther, and declares expressly, that if the stranding be followed by shipwreck, there can be no contribution from the goods saved—for the rule is then "save who can."

Against these authorities the American Courts, after the remarkable conflict of opinion above alluded to, have finally settled that the rule of the Rhodian law has been totally misapplied to cases of voluntary stranding, that it was never designed to have, and never ought to have any such application.

That rule related only to an ineffectual *jettison*, strictly so called, which means simply a throwing over of goods, and has no reference to a sacrifice of the ship, except to a general and involuntary shipwreck. Moreover, if it did apply to cases of voluntary sacrifice of the ship, its spirit is entirely fulfilled in granting the right of contribution in such cases—for the object of the sacrifice is fully accomplished in the safety of the cargo and crew, and evidently all that can be meant, in any reasonable interpretation of the word *salva nave*, (the ship being saved,) in that connection, is that the object of the jettison should be attained.

The fact that the object of the jettison in early times, was always the safety of the ship and crew, is sufficient to account for the peculiar wording of the law, and we cannot therefore insist on confining its evident spirit and principle within the literal meaning of those words, in this age, when it is often as necessary and as prudent to throw over a ship—so to speak—for the safety of the cargo, as to jettison a cargo for the safety of the ship.

This reasoning seems to us conclusive as to the argument from the Rhodian law, and as to the principle involved, it seems very plain, that, if the damage which a vessel sustains by a voluntary stranding, though it be *almost* equal to the value of the ship, is the subject of contribution from the saved cargo, the reason which dictates and approves such a law, *must command* its extension and application to the case of a total loss of the vessel, and such is the construction now put upon it by the American Courts.

The ordinance of Koenigsberg is the only one of the foreign codes w provides in express language for the total loss of the ship by v stranding, and it declares that the goods saved shall contribute.

Voet in his commentaries on the Digest of the Civil Law same position, and remarks expressly, that, "if by common

ship has been run ashore, and *thus has perished*, the goods shall contribute, if saved."

We are not aware that the question has ever been raised judicially, abroad, except in two early cases at Amsterdam, in which the judges decided against the right of contribution; but those decisions have been quite generally disapproved, and severely criticised by the high authority of Bynkershoek in the Ordinance of Koenigsberg above quoted.

In England the question is still unsettled, and Mr. Shee, the able Editor of Abbott on Shipping, argues mildly against the right of contribution in such cases; and Mr. Stevens in his work on Average, argues zealously to the same effect.

In America the first case arose in 1798, and was decided by the Court of Appeals of the State of Virginia on the authority of the foreign codes, against the right of contribution.

This was followed in the Supreme Court of New York in 1812, by a very able opinion of Chief Justice Kent, afterward Chancellor Kent, who after a thorough investigation of the foreign and home authorities, pronounced an opinion to the same effect as that of the Court of Virginia.

In the same year the Supreme Court of Pennsylvania, with an independence somewhat peculiar to that Court, and without any deference to either of the above decisions, expressed a decided opinion against them, and granted the right of contribution against a very valuable cargo, composed mostly of silver coin belonging to the Uflited States Treasury.

It is probable that the decision in this case was somewhat influenced by the exceeding value of the cargo, and by the evident sacrifice of the ship solely for the cargo's preservation; but whether it were or not, that decision dates a new era in the law of voluntary stranding.

It was soon followed by the same Court in another case, and by the Circuit Court of the United States for the same State, in a very learned opinion of Justice Washington, who was the first who attempted to answer the learning and the reasoning of Chief Justice Kent in the case mentioned above, and subsequent decisions have proved that he was eminently successful in that attempt.

The next case was that of Walker against the United States Insurance Company, in which the Supreme Court of Pennsylvania, apparently forgetful of its antecedents, and without any motive that we can detect in the circumstances of the case, followed the old doctrine of Virginia and New York, and decreed against the right of contribution.

The Court based their opinion on the fact that the case was not one of voluntary stranding, as "there was no act done in pursuance of the intention to run the vessel on shore—for the vessel became ungovernable the

instant the cables were cut, and was driven on the rocks exclusively by the wind and the waves."

With due deference to the learned Court, it seems to us, that the cutting of the cables was itself such an act and a sufficient act to make it a case of voluntary stranding, as it was proved, that, by cutting them, the ship went ashore a quarter of a mile from the place where it would otherwise have gone, and that " but for such change of place, the vessel, cargo and crew would all have been lost."

In 1839, the case of the Columbian Insurance Company against Ashby, arose in the Supreme Court of the United States, and after a most thorough and searching argument by very eminent counsel, Mr. Justice Story in delivering the opinion of the Court, said—

" We follow without hesitation the doctrine as well founded in authority, and supported by principle, that a voluntary stranding of the ship, followed by a total loss of the ship, but with a saving of the cargo, constitutes when designed for the common safety, a clear case of General Average."

This decision was generally considered as settling the question in this country, but the Supreme Court of Pennsylvania thought otherwise, and within three months, entirely rejected its authority, and decreed against the right of contribution in the case of Meech *vs.* Robinson.

The only distinction attempted to be made in the circumstances of this case, was, that the vessel would inevitably have been lost in any event, and therefore it was not a voluntary stranding, although a regular consultation of the officers had resulted in a decision to run the vessel on shore, which was done.

It seems only necessary to remark to this, that the same fact of inevitable loss existed in most of the cases mentioned where the right of contribution has been granted, and in one of them the captain testified directly, that, " all the men in existence could not have prevented his ship from going on shore."

It is evident from these cases, that, if we were to count opinions instead of weighing them, it would be impossible up to this point, to determine what the law is on this subject. But few cases can be found in the books, which have been more thoroughly investigated, or which have employed more of the best professional and judicial talent in the country, and yet the conclusion is, so far that, Washington, Story, and Tilghman stand opposed to Kent, Gibson and Kennedy.

It seems clear to us, although there are plausible and forcible [illegible] to it, that the law as laid down by Justice Washington, and appro[illegible] the Supreme Court of the United States, is founded in exact equity [illegible] most enlightened and wise policy; and as it has since been [illegible]

ed by the same Court in the comparatively recent case of Barnard against Adams, it can no longer be considered an open question in this country.

The contest is settled, and the American scholar can but rejoice at this as another instance of the superiority of American jurisprudence over the technical rules and narrow construction of most of the foreign codes, and of the exemplary wisdom which has presided, particularly in our admiralty tribunals, making our law, what it has long boasted itself to be, the perfection of reason.

In reviewing the topics which we have feebly discussed in these essays, including as they do the most prominent and important questions in the law of the shipping, leading us far back into the learning of the earlier ages, we can but admire the justice, the convenience, and the economy which so evidently distinguish and characterize the American Admiralty law. The simplicity and the certainty of our remedies, the celerity and informality of our proceedings, and, above all, the just jurisdiction of our tribunals, seem to us not only to facilitate justice, but directly to encourage trade, by promoting and confirming that mutual confidence of safety among, men which is the soul of commerce, and which binds nations, as social necessities and intercourse binds individuals, in the strongest natural bonds to live in unity and peace.

The principal questions we have noticed, seem intimately connected with three great names, each of which, though shining with a distinct and different brilliancy, is an honor to our law, and we cannot leave the subject without adding our humble praise to that high eulogy, perhaps the highest which conscientious judges are capable of receiving, the silent influence of their opinions on succeeding ages.

What Justice Story did for the lien for freight, giving it efficiency and extent, creating it anew, as it were, from the false construction of the old law, Judge Ware has done for the reciprocal lien on the ship, and it is but just to add, that, in granting the process *in rem* against the vessel, a peculiarly American process, he defended it with a vigor of reasoning, and an extent of learning rarely to be met, and which must *command* respect, even in countries where its doctrines are not admitted.

Justice Washington is the third, and the law of voluntary stranding, will enshrine his memory as long as maratime commerce shall endure.

Their names have passed into history, with the other gifted and great, embodyments of their country's honor, and shall remain forever intimately connected with the most imperishable parts of history, the eternal principles of Justice and Truth. W. W. B.

10 Wall street, New York, August 28, 1857.

REDUCTION OF TONNAGE

It is a matter of no small moment to ship-owners to have their ships measured by that rule or law which reduces the liability for light dues and port charges to the minimum standard; hence, any decrease in the tonnage of vessels is equivalent to a decrease of the charges to which shipping is subject. For the benefit of the ship-owners of the United States, we copy some official and statistical information from an English paper, furnished by a correspondent, in reference to the working of the second part of the Merchant Shipping Act of 1854. The nature and meaning of the term "Register Tonnage," as established by this law, is also furnished—a term, as it regards former enactments, generally considered as incapable of satisfactory explanation. To this intent the following document has been issued to the owners of all ships on the occasion of their registry, and is as follows.

A BRIEF EXPLANATION OF THE NATURE OF THE REGISTER TONNAGE OF A SHIP AS ASCERTAINED UNDER THE "MERCHANT SHIPPING ACT, 1854;" AND OF THE EASY MEANS IT AFFORDS FOR ESTIMATING APPROXIMATELY THE MEASUREMENTS AND DEADWEIGHT CARGOES OF SHIPS.

1st. The register tonnage of a ship expresses her entire internal cubical capacity in tons of 100 cubic feet each; so that it is only necessary to multiply such tonnage by 100, and the entire internal capacity of the ship in cubic feet is immediately shown; and from which an owner can, by making such deductions for passengers, provisions, and stores, &c., as the circumstances of the particular voyage may require, arrive at the net space in cubic feet for the purposes of cargo.

2d. To ascertain approximately, for an average length of voyage, the measurement cargo at 40 feet to the ton which a ship can carry, (as many owners may be unwilling to trouble themselves with the above-mentioned deductions,) it is only necessary to multiply the number of register tons contained under her tonnage deck, as shown separately in the certificate of registry, by the factor, 1 7-8,* and the product will be the approximate measurement cargo required.

3d. To ascertain approximately the dead-weight cargo in tons which a ship can safely carry on an average length of voyage (dead-weight bearing a certain qualified relation to internal capacity,) it is only necessary to multiply the number of register tons under her tonnage deck by the factor 1½,* and the product will be the approximate dead-weight cargo required.

4th. With regard to the cargoes of coasters and colliers ascertained as above, whose short voyages require but a small equipment of provisions and stores, and whose frames or shells are of larger scantling in proportion to their capacity than in the larger classes of vessels, about 10 per cent. may be added to the said results, while, on the contrary, about 10 per cent. may be deducted in the case of the larger vessels [illegible] longer voyages.

5th. In the case of the measurement cargoes of steam[illegible] the spaces occupied by the machinery, fuel, and passengers' cabins under the de[illegible] deducted from the space or tonnage under the deck, before the application of the [illegible]ent factor thereto; and in the case of their dead-weight cargoes, the w[illegible]y, water in the boilers,

and fuel, must be deducted from the whole dead-weight, as ascertained above by the application of the dead-weight factor.

The appended table, already-mentioned, is a statement of the number and tonnage of British Shipping measured under the Merchant Shipping Act during the first two years of its operation, from the 1st of May, 1855, to the 30th of April, 1857.

From this document it appears that, up to the 1st of May last, near 9,000 ships, (British ships,) of an aggregate tonnage of about 1,822,000 tons, have been measured under the new law, amounting, as regards tonnage to nearly one-half of the whole tonnage of the United Kingdom. Of these vessels, about 6 000 are those which have been remeasured mainly at the request of the owners. It is also seen, by inspection of the table, that under the new law the aggregate tonnage of the remeasured ships is decreased to the extent of about $7\frac{1}{2}$ per cent. But it is here to be observed that, as the remeasured vessels are mostly under 300 tons, a class of vessels having no houses on their decks, while the larger classes, yet remaining to be measured, are mostly fitted with such erections, it may be expected that this decrease will not be maintained on the readmeasurement of the whole Merchant Fleet.

It further appears by reference to this document that 340 ships have been remeasured and registered under the approximate Rule 2, a short rule intended only for the casual and temporary measurement of loaded ships.

It has been objected that the tonnage under this approximate rule is of greater amount than the tonnage under Rule 1, and that such discrepancy is a great defect in the new system. But this difference of tonnage complained of, which the advocates of the system say is entirely intentional and can be altered at any time in a few minutes, is alleged as the best proof of the care and attention which have been paid to the interest of British Shipowners during the transition of their ships from the late to the new tonnage. Had the approximate rule, for instance, been made to give the same tonnage as Rule 1, the consequence would have been that foreign loaded ships, to the extent of about 6,000 annually—all necessarily measured under the approximate rule—would have the new reduced tonnage, while British ships not yet brought under the new law would to that extent suffer under an unfair competition with them. Consequently, the having made the approximate rule to give about the same tonnage in ordinary cases as the late law, and so to continue it until the great body of British ships have passed under the new law, is no more than an act of simple justice to British owners; and, therefore, the difference found to exist between the tonnage of the two rules of the present system, instead of being a defect, is, in fact, one of its features meriting the best thanks of the British owner.

It has been alre dy remarked that the average decrease of tonnage, in passing from the late to the new law, on about 6,000 ships, amounts to about $7\frac{1}{2}$ per cent., some ships showing, arising from the empirical nature of the late law, a considerably greater, others a less decrease than this—the greatest and least deviations about 20 and 3 per cent, being found in those vessels in which the form varies most from the usual form of Merchantmen.

It is therefore necessary that owners, before exercising the right of having their ships remeasured, should, in forming their estimate on these points, in order to prevent disappointment, take these various elements into their consideration.

In closing these remarks there remains only to notice, from the facts of two years' experience, that there can be no doubt the new law of tonnage gives to each ship with practical accuracy her entire internal cubical capacity in tons of 100 cubic feet each, as already stated in the above explanatory document, and as in that tonnage no evasion of capacity can be practised by the adoption of any particular shape, builders are left entirely free to construct the most eligible vessels; and that the register tonnage, except in the case of

steamships,† so representing the entire capacity of each vessel is, therefore, a most just standard between ship and ship for the levying of all charges, as well as the fairest basis for commercial and statistical purposes.

TABLE OF THE NUMBER AND TONNAGE OF RE-MEASURED VESSELS, RE-MEASURED BETWEEN 1ST. MAY, 1855, AND 30TH APRIL, 1857.

Class.	*No.*	*New Law.*	*Late Law.*
Sailing Vessels.	Vessels.	Tons.	Tons.
Under 100 tons	2,150	130,924.69	144,465.12
From 100 tons to 200 tons	1,528	225,678.07	244,743 04
200 tons to 300 tons	786	189 580.46	205,058.76
300 tons to 400 tons	893	135,295.57	145.834 45
400 tons to 500 tons	153	67.035.96	72,077.83
500 tons to 800 tons	233	146 337.04	157,165.89
800 tons to 1 500 tons	177	177 514 29	192.073 91
1,500 and upwards	6	10,968.31	11,778.01
Total	5,426	1,083,334.39	1,173.197.01
Steam Vessels	238	45,649.18	52,243.58
Steam and Sailing-Vessels	5,664	1,128,983.57	1,225,440.59

Result of New Measurement.—Sailing Vessels, difference 89,862 tons—7.65 per cent. decrease upon late law. Steam and Sailing Vessels, difference 96,457 tons—7.87 per cent. decrease upon late law.

NUMBER AND TONNAGE OF ALL VESSELS MEASURED UNDER THE NEW LAW DURING THE ABOVE PERIOD.

		No.	*Tons Regr.*
Old Vessels Remeasured	Rule 1	5,664	1,128,983
New Vessel- Measured	"	2,300	509,434
Old Vessels Lengthened, Altered, &c.	"	676	120,176
Old Steam and Sailing Vessels	Rule 2	340	75,760
	Total	8,980	1,834,353

* The deductions necessary to be made for provisions and stores, &c., agreeably to the opinions of several experienced shipowners and brokers, are allowed for in the selection of the two respective factors; but the spaces under the deck which may be appropriated to passengers, being governed by no rule, must be made by a separate deduction, with resp to the rule for measurement cargoes as they may be found to exist in each individual

† The register tonnage of steam vessels, being often of an anomalous character, from the defective method of computing the allowance for the propelling power, ✝ screw or paddle ships, cannot be said to constitute that same equitable stand between steamer and steamer as above predicated, of the register tonnage of sailing vessels.

HISTORY OF SHIPBUILDING IN NEW YORK.

(*Continued from page* 348.)

On the decease of Isaac Webb, in 1840, his son, Wm. H. Webb, entered upon business under the auspices of his father's customers. Although then a young man, he has pursued a very successful course in shipbuilding, and abundantly secured the financial fruits of enterprise. About this period the shipping business was quite depressed, and few vessels of considerable size were built. But the fame of our shipbuilders had become world wide. The Russian Government having learned the reputation of David Brown, as a ship-builder, commissioners were appointed by the Czar, and instructed to contract with Mr. Brown for the construction of a war steamer; but by the management of the friends of Wm. H. Brown, the Russian officers were introduced to that gentleman, with whom the contract was made—nor was the mistake discovered until it was too late to be rectified. The ship was built, but did not give the abundant satisfaction that was expected by that Government; the consequence was that the Czar went to England for his ships. Several years after, Mr. Griffiths was invited by the Russian Government to offer proposals for the construction of a war steamer—the proposals were made, but through the discreditable interference of a New York firm of ship-builders, the good intentions of the Government were again thwarted, and the vessel was not built. Tricks of this kind have made our Russian customers rather shy. The years 1841 and 1842 rolled by successively without material improvement in trade.

In 1843 Mr. John W. Griffiths proposed several improvements in marine architecture. These were embodied in a model of his construction, which was exhibited at the fair of the American Institute in this city, and awakened the attention of the entire shipbuilding fraternity in New York. As in every instance where the quiet course of conservatism is arrested by the law of progress, so in this, there were not wanting those who decried Mr. Griffith's innovations in modelling. But denunciation was only the signal for argument. A challenge for discussion followed, and the clash of mental weapons resulted in the delivery of a course of Lectures upon the science of shipbuilding, at the rooms of the American Institute. These lectures, which were the first upon this interesting subject delivered in the United States, decided the points raised in favor of Mr. G———, and disseminated a correct knowledge of the principles of modelling. The suggested improvements consisted mainly in relieving the bows of their abrupt termination, by carrying the head of the stem forward in a curved line. This, while it eased the shock of the sea, caused the bows to appear lighter in their continuation of flare to the knightheads. Another improve-

ment was proposed to perfect the stern, by rounding up very considerably the ends of the main transom, thus relieving the quarter of its cumbrous buttocks, and more nearly equalizing the weather and lee lines of flotation, allowing the vessel to carry less weather-helm. The stereotyped height for laying the transom, was repudiated and the stern farther lightened by bringing the knuckle of the counter to correspond with the elevation of the deck. The centres of gravity and rotation were brought nearer the midlength of the ship. Hollow water lines were also introduced, and formed the text of strenuous opposition from builders of established fame—some of whom subsequently so far modified their views of "*round water lines*," as to compromise upon the *straight* water line which they thenceforth adopted. Such is the obstinacy of conservatism.

The utility of Mr. Griffith's improvements were silently investigated by others, and the result stored up for future application. Commercial men did not wait long before testing their usefulness, and the partial adoption of them by a first class builder, led quickly to a universal appreciation of their merits. Thousands now admire the beauties of modern bows and sterns, who perhaps never heard the name of that mechanic who first proposed and defended their points with so much zeal and success before the meetings of the American Institute fourteen years ago. The energy with which he subsequently urged the adoption of scientific principles in giving forms to ships, led to the establishment of a marine architectural institute in 1847; over this institution Mr. G—— was called to preside. It flourished for about two years, and furnished the opportunities for qualifications in draughting and modelling to a large number of young men, most of whom have become successful shipbuilders.

The first ship which was built to test the utility of the above improvements, was the famous *Rainbow*, of 750 tons, for the Canton trade. She was owned by Howland & Aspinwall, and built by Smith & Dimon, in whose employment Mr. Griffiths spent several years as draughtsman and builder. This ship was allowed by common consent to be superior to all others, and it was positively asserted by her commander, Captain Hayes, that she could not be excelled. She was a rapid sailer, and once made the voyage to Canton out and home in six months and fourteen days, including three weeks in port, discharging and loading, and brought home news of her own arrival out. She was then under command of Capt. Land. On a later voyage she was lost, as is supposed, off Cape Horn.

Notwithstanding the bold avowal of Capt. Hayes, Me- A. Lowe & Brothers soon afterwards employed Brown val ship, and the *Houqua* was produced for Captain In this ship the new features of the *Rainbow* qua distinguished herself for sea qualities, an d a deter-

mination amongst rivals not to be outdone. The spirited owners of the *Rainbow* gave Smith & Dimon another contract, and the renowned *Sea Witch*, of 907 tons, leaped forth without an equal on the ocean for speed. Hers was the first nondescript head ever originated, and was the design of Mr. Griffiths. The *Sea Witch* made a passage to California in 97 days, the shortest ever performed by a ship of less than double her tonnage. But the house of the Messrs. Lowe were not to be beaten in the contest for the superiority in ships and short voyages. Capt. Palmer again took the field in the superintendence of the ship *Samuel Russell*, of 940 tons, built by Brown & Bell. This vessel approximated still nearer the model first proposed by Mr. Griffiths, and proved herself one of the fastest and best seaboats on the ocean course.

The wonderful performances of these original clipper ships, aroused the shipowners of New England, and soon were builders of reputed skill found on shipboard with note book and pencil in hand canvassing in detail the innovations which led to such famous results. Not only the ships, but their models were scrutinized, and those who once thought they had perfected ship-building in the East, cast their notions to the winds and departed home to recite new lessons in the now progressing art.

In 1848 David Brown retired from business, leaving the yard to his partner, Jacob Bell. Meanwhile accessions had been made to the number of New York ship-builders as follows:—The firm of Perine, Patterson & Stack, (Williamsburgh,) in 1845; Burtis & Morgan, in 1844; Capes & Allison, (at Hoboken,) in 1849, and others.

The car of progress still moved onward in New York. Jacob Bell built the *Oriental*, of 1,007 tons; Smith & Dimon produced the *Memnon*, of 1,084 tons, clippers carrying more than their tonnage, and measuring distance at sea by time instead of miles, as then became the custom. The *Comet*, *Invincible* and *Swordfish*, by Mr. Webb were also constructed in 1851. Westervelt & Mackey launched their first clipper, the *N. B. Palmer*, of 1,406 tons, in the same year, adopting some of the new principles of modelling.

At this time New York had become the school for live ship-builders from every part of the country. New York models came in demand, and there were few builders in the country who did not obtain at least one for practical purposes.

The attention of our merchants and ship-builders was in 1847 and '48 directed to steam for ocean navigation. The utility of the new power had been partially demonstrated in this country some thirty years before by the Savannah, and the steamers on our inland and coastwise waters had given every reasonable assurance that the proper model only was wanted to introduce steam successfully upon the ocean. That this could be furnished

in New York, did not admit of a doubt. The feats of her clipper ships and the marvellous speed of her steamboats had excited the wonder of the world. The Rochester and Swallow were about the first of the clipper steamboats, then came the Knickerbocker, North America, South America, and the far famed Oregon defying every steamboat of her day. The America was also among the fastest of her time, while the Hendrick Hudson and the ill-fated Atlantic, (lost on the Sound,) were magnificent and costly, and vied with any in point of speed. The Isaac Newton and the New World eclipsed all as floating palaces on the Hudson, while the Reindeer, Alida, and Francis Skiddy proved the swiftest vessels that had ever rested on the surface of the water.

Such was the current of improvement in ship-building, when Mr. E. K. Collins determined to establish the trans-atlantic line of steamers which now bears his name. It was at first intended that David Brown, then of the firm of Bell & Brown, should be charged with the responsibility of their design. Accordingly the services of Mr. Griffiths were engaged by Mr. Brown, and investigations and models were made. Mr. Brown originated several inventions for the application of iron to strengthen the frames of these steamers, and Mr. Griffiths made models of them for the patent office, where the rights were secured. The model and calculations were made, and the timber was even bought for their frames, but it fell out that the contract for the first ship of the line—the Atlantic—was given to Wm. H. Brown.

David Brown, disgusted with the course pursued towards him, this being the second time his namesake had got the advantage of him, and chagrined with the loss of time and money, very soon retired from business. His partner, Jacob Bell, afterwards built the Pacific and Baltic.

The steam-ships Washington and Hermann had been built in 1847, by Westervelt & Mackey, by dimensions furnished by Mr. Mills, formerly a broker of Wall street, and as a consequence reflected no credit upon American genius, because of their dull speed and precarious stability. Mr. Collins was desirous to avoid these defects, and upon being informed that the stability of ships was a mathematical inquiry, he caused an investigation to be made by Mr. Griffiths before the dimensions and model were finally adopted. The result has shown the wisdom of this proceeding, and exploded the absurd idea which had before that time prevailed that the engines and boilers of a steam-ship served the part of ballast, although the centre of gravity of the entire machinery was placed considerably above the centre of gravity of displacement. Where these calculations [illegible] not attended to, the *logging* of the ship's sides to [illegible]her, in som[illegible]es even to the extent of two or more feet on e[illegible] resor[illegible]ter launching, in order to make the vessel float [illegible]m.

Before the Collins steamers were fairly commenced, the steamship Georgia was placed on the stocks, in the yard of Smith & Dimon, for George Law. Mr. Griffiths with a partner built this ship on sub-contract, and she was the first steamer modelled with the centre of displacement abaft the mid-length of load line, or in other words, with the longest and sharpest end forward. She had also an abundance of beam for stability; but after being built, and having proved herself the fastest and most successful ocean steamer of her day, her qualities were signally impaired by adding another deck in height. The Atlantic and Pacific soon took their places on the course to Liverpool, beat the Cunard steamers, and thus secured the American name the victory in every form of navigation, and every type of ship.

The year 1850 was notable for improvements. The famous yacht America, built by Mr. George Steers, excited the wonder not only of the sporting fraternity, but of all nautical men. Her success was established in both Europe and America. But perhaps the most useful stride taken in the furtherance of improvement in ship-building in this year, was the publication of GRIFFITHS' TREATISE ON MARINE AND NAVAL ARCHITECTURE.—This work was in quarto form; it contained a most able exposition of the Theory and Practice of Ship-building, and met with universal favor. Its most valuable chapters were those which unfolded the fertile mind of the author in the field of invention and improvement. His feasible suggestions captivated the mechanical reader, and were rapidly carried into practice in all parts of the country, and even in Europe, where hundreds of copies were sold. Nor was this all. The publication of this work was followed by a pressing demand for models and drafts from all parts of the world. These Mr. Griffiths supplied from New York for a number of years in large numbers.

In 1851 and '52 the development of the California trade demanded an increase in the magnitude and speed of our sailing ships, while the opening of communication by steam with foreign and domestic ports called for the construction of line after line of steam-ships. The ship-yards were full of life and prosperity; wages went up to almost fabulons prices, and still the merchants of New York failed to get complete accommodations at home in the line of their wants. At one period scarcely a sailing-ship could be found on the stocks—they were all steamers, either for river, coast or ocean navigation. Our builders having so much to do with steam, the sailing ships were many of them contracted in Boston and other parts of the East, thus while New York became famous for steam-ships, Boston bore off the palm for clipper ships.

In 1853 the idea of a six-day steamer to Europe, was projected by William Norris, Esq., of Philadelphia, renowned for his skill and enter-

prise in Locomotive Engineering. In this grand undertaking, Mr. Griffiths became associated with him, as the constructor of the ship. The work was began, but before the vessel was quite completed, a misfortune prevented the accomplishment of the design—the ship was sold, and finished by other hands, because Mr. G. refused to alter his design. With far less than the measure of power originally intended, she proved one of the fastest steamers ever built.

In 1854 the business of shipbuilding began to suffer a decline, the market gave evidences of being over supplied with shipping, the California trade showed symptoms of falling off, and news of the Crimean war in Europe finally determined a decline in the activity of the ship-yards.

In this year began an enterprise, which, although founded upon the prosperity of ship-building, has been obliged to toil its way through a long season of adversity incident to the shipping business of the entire country. This enterprise, of which the public have now been patrons and spectators for three years, has been calculated to advance still farther forward the standard of progress in ship-building, by collecting and disseminating the most valuable information, while it preserved from oblivion a record of transpiring events. We refer with all becoming modesty to the *Nautical Magazine and Naval Journal*. As a medium of communication, correspondence, and information, the arts of Shipbuilding, Engineering and Navigation cannot well afford to do without it. As a work for reference, it already contains enough to make it invaluable to the classes for whom it is designed.

Since the beginning of 1855, the history of ship-building in New York, and indeed in every part of our country, will be best gleaned by the future historian, from the pages of this Magazine. We therefore leave the subject here.

THE NATIONAL OBSERVATORY.—This institution, under the management of Lieutenant Maury, has already attained a reputation scarcely inferior to that of the oldest and most celebrated institution of the kind. The chronometer department, upon which, in a great measure, depends the safety of our national vessels, is regulated by the strictest rules and most enlightened management. The principal telescope, worked by beautiful machinery in the revolving dome, is a feature of peculiar interest, and would well repay a visit by any one who has not already seen it. As is generally known, a large black ball descends the flagstaff of the dome at precisely 12 o'clock, noon, by which citizens and mariners may regulate their time-pieces. The proper time to visit this institution, is from nine o'clock, A. M. to three P. M., during which time visitors will always meet with polite attention from the officers.

DEEP SOUNDINGS BETWEEN MALTA AND THE ARCHIPELAGO, IN 1856 AND 1857,

With Remarks on the best means of obtaining Deep Soundings.

BY CAPT. T. SPRATT, R.N., C.B.

Having in May, 1856, obtained three or four deep soundings with silk line between Malta and the Archipelago, by which the greatest depth seemed to be about 2,200 fathoms, I provided myself with a quantity of seine twine, every 100 fathoms of which weighed 6lbs., but only 1lb. when in water, with the view to carry out the continuous line of soundings over the same ground, and to trace the bottom the whole way along this central and widest basin of the Mediterranean.

I started from Malta in H.M.S. *Medina*, on May 18th, and in tracing the bottom from Malta, found a plateau or bank from 50 to 70 fathoms only below the surface, extending to about thirty-five miles East of Valetta, and when due South (true) of the East coast of Sicily, it commenced to dip; so that at forty-five miles from Valetta, we found about 300 fathoms.

But from this distance the surface of the plateau makes an abrupt descent, so as to present a submarine scarp of fully 6,000 feet, for at the distance of only ten miles further, and fifty-five from Valetta, we found the bottom to be 1,530 fathoms (9,180 feet) deep; being nearly as abrupt and high as the East face of Etna.

From thence the bottom is more level, the next thirty miles showing a gradual descent of 600 fathoms; where the maximum depth was attained, viz., 2,150 fathoms, which being 12,900 feet, shows that the summit of the bank is 2,000 feet higher above its base than Etna is above the sea.

This great depth at the position of about ninety miles East of Malta, has a special interest for seamen from the long entertained opinion that a rock only two or three feet under water, existed here. Even up to a very recent period has it been searched for; and it is only twelve months since that one of the best of our Greek pilots died, who used to assert that *he had stood upon this rock in early life* in the course of a voyage from the Levant to Malta in a merchant vessel. Nothing could shake his evidence and assertions to me regarding it, even up to the last year of his life.

But those assertions have also been supported by the declarations and indirect evidence of others, which, particularly in one instance, was proved to have been obtained from false logs and statements.

Frequent search in consequence of these assertions has been made for it by orders from the Admiralty and Commanders-in-Chief; of course without

success, as the soundings now actually obtained on and about the spot, shows that its existence is impossible.

For if Etna were thrown there, it could not reach the surface; and even abrupt as it is, and volcanic also, it has a broad base of nearly forty miles in extent; for although one side is only ten miles from the summit to the sea, the opposite is nearly thirty miles distant from it. The base of every mountain is in proportion to its height. No rock can rise like a colum from a depth of 2,150 fathoms; consequently, as the bottom is found to be level for thirty miles in opposite directions from the place of the supposed rock, there can be no submarine mountain there.

Two soundings of 1,870 and 1,950 fathoms were obtained in the same position last year by me with a silk line; and now they are verified by three more of 1,950 2,050, and 2,150 fathoms, with a line of seine twine about the same size, although only half as strong, in very favorable weather, between daylight and dark of May 18th of the present year.

As my soundings in H.M.S. *Medina* while crossing this broadest part of the Mediterranean, each contributed experience as to the best means of obtaining deep soundings, and as they are few in number, and have suggested the easiest and surest means of gaining them even in greater depths and in a breeze with some swell, I will allude to them in succession, with all the data and notes connected with the operation.

In obtaining deep water soundings, many practical difficulties present themselves.

First, in not having the proper weight, and a line best suited to attain a rate of descent that shall be sufficiently rapid to indicate when the weight is at the bottom by the interval of time in running out; and next from not knowing the strain which the line is able to bear at the required depth when thus running out, the strain increasing in proportion to the increasing resistance offered to its passing through the water by friction as the depth increases.

This has no doubt been the cause of many a failure, or the registry of erroneous soundings, from the impression when the line parted and the rate of running out became changed in consequence, that the lead had struck the bottom, particularly when heavy lines were used.

To explain this, it will be evident that when a weight is first let go, although attached to a line, the line offers no resistance if the reel on which it is coiled works freely; but as the line runs out, the heavy
bottom has to *drag* it down in consequence of the inc
the water on the line in passing through it.

Thus, if the weight is just under what the lin
suspended, when let go and descending at th

an hour in the water, its weight or strain on the line is immediately increased; and when the line begins to feel this *effect of friction*, which thus becomes an antagonistic resistance, or rather upward strain, it will almost immediately break.

It is therefore evident that for *every depth* the weight should be in proportion to the strength of the line. But as the depth is an unknown quantity, (in fact, what we want to learn,) to ascertain the weight, becomes a matter of accident or experiment.

I will more fully explain this by the sounding and experience of the third day, although a fact long before understood by many.

In connection with the object of obtaining soundings at these great depths, there have been generally two others combined, viz:—To detach the weight sent down, and—To bring up some indication of the bottom, as a proof that it has been reached; affording thus interesting information regarding the minute shells or vestiges of animal life existing or not at that depth, a subject of the highest interest to the naturalist.

Although these results give certain evidence of the bottom having been reached, they involve the necessity of hauling again all the line let down, which I have found to be always a difficult task, uncertain in its results, and producing serious inconvenience from delay and loss of valuable time in doing it during weather not too favorable for attaining such depths. It takes fully twice the time to haul in a line that it took to run out, unless the weight *always* becomes detached, in which I find a great uncertainty. It is due from me here to state that Brookes' American rod has alone succeeded with me in depths above 1,000 fathoms; but then only once, viz., in the great depth of 1,800 fathoms.

On the next trial in 1,700 fathoms, the same rod failed entirely, and I lost it in consequence, as I also did several others of the same forms, as well as some dozen of Bonnici's, in which at first I had the greatest confidence.

On Wednesday, May 20th, at 4.30 a. m., when about 164 miles East of Malta, I left the *Medina* in a cutter, provided with 8,000 fathoms of seine twine, that was capable of bearing from 22lbs. to 32lbs., average about 25lbs. To this was attached Brookes' American sounding rod, with a flat piece of lead and hollow shot, together of 9lbs., as a weight, with a hole bored through for the rod, as used by the Americans with a shot only. The rod and weight together was 13¼lbs. out of the water.

At 4.50 a.m. the weight was let go, and the boat kept from drifting before the light breeze and swell then prevailing by an occasional slight pulling of two oars, so as to keep the line up and down. At 5h. 56m. 0s. there was an evident diminution of the speed of running out, and bottom was supposed to have been reached. As I was anxious to obtain a cer-

tainty of the bottom by some mud brought up, and having the successful Brookes rod down, I resolved to haul the line in by hand, so as to prevent risk of breaking it with reel.

I was accompanied in the boat by my able assistant Lieut. Wilkinson, and each taking a turn at the first 100 fathoms to show the boat's crew the way, they finally succeed in hauling in 1,900 fathoms, when our hopes were disappointed by the broken end of the line coming in, the rod and 250 fathoms of it being lost.

Thus it was uncertain whether the weight had been at the bottom, or the line had parted in descending,—since its weight or tension, on hauling up had not been great from the first,—so that from this I supposed the rod had detached the weight and was coming up alone.

To verify this point, I resolved to try again, with a shot of the same weight, and with Bonnici's claw attached.

The shot was let go at 8h. 36m., and at 10h. 3m. in 2,150 fathoms, it appeared to be down.

At this trial 2,170 fathoms of the line ran out before there were indications that it was at the bottom. The average interval of time between the last 50 fathoms was 3m. 4s., whilst the interval between the following 50 fathoms was 8m. 32s. and 8m. 56s. Thus it was evident the former sounding of 1,950 was not true. It still appeared that the last might also be a false sounding, through the breaking of the line. To prove this, about 100 fathoms of the line were hauled in, when the strain became so great as to show that it was taut up from the weight, and by increasing the strain, the line gave way.

Thus it was supposed the bottom was felt, as there was no evidence of current, the line being easily kept up and down by the aid of a couple of oars now and then.

However, I felt it necessary still to verify this sounding by another with twine again, but with a lighter weight, so to vary the conditions, I attached an 8lb. shell to a new reel of twine, that worked very easily from being of a large diameter. This likewise showed a depth of 2,180 fathoms, being only about 10 fathoms more than the former, and was thus considered as a perfect verification. It took 1h. 37m. in descending, and occupied eight minutes more time than the former sounding with a 13½lb. weight. On this occasion I had abandoned all detaching instruments, in order to avoid any error or doubt when it was down; as it occurred to me that this could be best tested by weighing the line when slacked, and also when hauled with the shot lifted, or at the greatest strain that it would bear in voring to do so.

More than 100 fathoms of slack line being paid out, I weighed and found that the greatest strain on it was only from 1¼lbs. to 1

a spring steelyard, and this could be maintained so for any length of time, showing there was no appreciable upper or under current. I then hauled in the 100 fathoms paid out, and the tension increased to 4lbs. and 5lbs., showing that the strain was increased by being nearly taut; and on getting in a little more, the strain increased so much that the line broke by a pitch of the boat before it could be attached to the steelyard.

Thus the proof of the shot being on the bottom, was satisfactory. For had it not been so, it would never have increased the tension of the line in hauling up to more than 4lbs. or 5lbs., as we had experienced when hauling in the line the first time, and as I afterwards shall show by another, even if the whole 2,000 fathoms were thus hauled in by hand.

On May 21st we sounded twice with twine; the first time in 1,720 fathoms, the second in 1,620 fathoms, using on the first of these occasions Brookes' American rod, which for this once most happily detached itself. But by its doing so we were of course doubtful of the truthfulness of our sounding, from the weight or tension of our line decreasing instead of increasing, as follows. With 1,900 fathoms out, it was from 1lb. to 2lbs. when slack; but when hauling in and taut up and down with the whole line consequently coming up with its whole resistance from friction, was 5lbs., and with 1,500 fathoms out, 3lbs.; 1,000 fathoms out, 2lbs., and 500 fathoms out, 1lb. So that had the line parted near the bottom, there would have been the same results.

But after carefully hauling all up by hand, it was very satisfactory to find that the American rod was brought up and bore evidence of having been on the bottom, as the lower part of it was covered for three inches with a slight coat of tenaceous yellow clay.

The rod, which was of iron, having been in part greased, was in those places protected from the action of the acids of the salt water. But where not greased, they had turned it a rusty red, and the clay in contact with it, a deep ochre.

Two important points had thus been determined by this plan of weighing the line, viz.: that by it, with a sinker, without any detaching instrument, the bottom could be certainly felt when down, and thus clearly distinguished from a false indication through a parting of the line, or a real one through the detaching the lead, by the instrument; as it is evident that in either case, the whole tension could never exceed 5lbs. The second point was the ascertaining that the weight of the line only, when shot was at the bottom, was sufficient with a free reel, to keep it continually running out; being no doubt aided by the pitching of the boat and swell together, since it was very evident there was no current, superficial or under, so as to tighten the line, unless the boat was allowed to drift before the swell or light breeze.

For as the rate at which the line run out, the last 100 fathoms exactly equalled a rate of 1,000 fathoms per hour, or one knot, a sensible superficial or under current must have been observed.

Having come to the conclusion that to ascertain deep sea soundings with certainty, it is best to be done *independently* of all detaching instruments, with the view of bringing up bottom; and best to be done also with the lightest line possible, viz.: a twine or silk line, so as to be carried away when at the bottom:—But that the bringing up the bottom should be treated as a perfectly independent, although simultaneous operation, at an occasional sounding instead of at every deep one:—

I therefore prepared all my deep sea lines and spun yarn to the amount of more than 2,000 fathoms, and had a sample instrument for bringing up bottom, made out of two pieces of leaden tube, each three feet in length, and lashed together as a sinker.

The two pipes or tubes weighed 18lbs., and were provided with a valve on the upper apertures of each, so as to open when descending, that the water might pass through, and to close when being hauled up: so that it was hoped that the pipe would retain the clay of the bottom as far as immersed into it, and also water from the bottom in the upper part of it.

This plan was consequently tried at noon of the 20th, and again at the sounding on the 21st. In the last it was successful; but in the former trial it failed through the line breaking, from the tubes having been weighted with two 32lbs. shot to take them down more quickly.

In the latter trial, however, the tubes were sent down in 1,620 fathoms, and returned with yellow clay sufficient to fill a coffee-cup. But of course it did not indicate, by any sensible diminution of rate, when the bottom was attained, in consequence of the line, after 300 fathoms had run out, being itself heavier than the weight. So that when the 1,700 fathoms were out, of course the line continued to descend at a uniform rate from its own gravity only, from being thus so much (viz.: seven times) heavier than the sinker. The effect of the latter was consequently absorbed or lost in any effort to detect it by time, or weight by hand.

This leads me to remark on the errors and difficulties connected with obtaining deep sea soundings by a heavy line, such as has been often employed, viz.: iron wire, deep sea lines, or spunyarn also, from their increased resistance from friction as well as weight. Because it must be evident that when the line out exceeds the weight used as a s[illegible] time of reaching the bottom is not easily detected by the int[illegible] the line will descend almost uniformly both *before and afte[r]* own weight alone, and without any necessity for conceivi[ng] result of a "swinging power from under currents," as [illegible]

Lieut. Maury, to be the chief reason why a line continues running out after the weight has reached the bottom.

And I must here observe, that when the line was known by us to be at the bottom, in about 2,000 fathoms, from there being no current, the tension of 1½lbs. and 2lbs. which the line then bore on the reel by its gravity, was sufficient to make it turn, assisted as it always must be in a boat by her motion from swell, &c.

To explain more clearly this difficulty and error connected with stout heavy lines, I have had the following quantities of deep sea lines and spunyarn weighed in and out of water, as they are what have been commonly used previous to the American plan of twine or silk line, which is found so successful now.

	Fathoms.	Weight dry.	Weight in water.
Deep sea lines	100	22.5	8
9 yarn spun yarn	100	32	5
6 "	100	17	3.5
3 "	100	8	2

Thus a deep sea line of	100 fathoms,	weighs	8lbs.	in water
" "	1000	"	80	"
" "	2000	"	160	"

Consequently, in a depth of 2000 fathoms, it would require a sinker of nearly 200lbs. to exceed the weight of line out; but beyond that depth, say 4,000 and 6,000, as depths that have been in some cases given by such means, the weight required to exceed the line out, would have to be nearly 600lbs., or the quarter of a ton. But to be felt or to sensibly indicate the time of its touching bottom by an evident change of interval, at least double those weights would be required, viz.: nearly half a ton in 600 fathoms. But should a superficial current exist also, as nearly double the line might have to be paid out before the bottom was reached by reason of the boat's drift away from the vertical position of the lead, much more weight would be required to know when the line was down, and such as no one has ever yet attempted to attach to a deep sea line or spunyarn, to overcome their gravity at that depth. And then no spunyarn generally used for such purposes, would bear the required weight for those depths, and would consequently break long before, as I have shown.

This then is another of the difficulties and causes of doubt existing with all very deep soundings obtained by such means. For unless the line is about the same specific gravity as sea water, the errors and difficulties increase in increasing rates with every increase of depth. This is mainly considering the question in depths where there is no sensible current.

But with currents which are appreciable, superficial currents, as we

know do exist sometimes, the difficulty is then augmented, and with all due deference to the talented author of the "Physical Geography of the Sea," and all due respect and admiration of his most valuable researches, and elevated and *amiable* reasonings on these interesting inquiries, I humbly think that the elements to be considered in connection with the running out of a line, after the lead is down, in a deep sea, are the gravitation of the line itself as one cause, (and as I have experienced and shown to exist with common twine,) as well as superficial currents (not under currents) as another. For I do not believe any such universal under currents exist so as to be the cause of a line running out after it has reached the bottom. But I fully admit a superficial current as a very frequent or general fact, especially in the great oceans; and the experiments adduced by Lieut. Maury seem to me to be only evidences of an upper current, not an under one. I allude to the sinking of a piece of wood in the Atlantic to several hundred fathoms, and buoying it with another piece of wood that would bear it.

The old naval plan of lowering a large iron pot from a boat, when the ship is becalmed, was a more primitive mode of ascertaining the same thing, viz.: the superficial current.

I cannot comprehend that it will show any other, or rather how an under current exclusively is to be thus recognised from such an experiment.

That an appreciable under current may exist in some localities, is probable—such as where two strong streams of great difference in temperature meet, like the Gulf Stream and the Arctic Stream off Newfoundland. But that it is a universal system, such as to affect the operation of a deep sea sounding by dragging out the line, or to be a great source of circulation of the ocean, and cause of the great superficial currents that exist, I do not believe, and thus agree with the opinion of Sir Charles Lyell and Admiral Smyth.

And I have given examples of soundings obtained at considerable depths, where no appreciable current was felt, viz.: those showing the depth of the sea-bed between Malta and Crete or Candia. They were not vitiated by any current; so that we have in those depths, as given by our soundings on that track, a sea-bed as deep as the sea-bottom between America and Ireland.

But as my object is to give my experience in obtaining these deep soundings for the benefit of others following the same interesting research, I am induced to show what seems to me the only way of obtaining the actual depth in localities where there are superficial currents, as in the Atlantic Ocean; for those deep sea-soundings shown by Mr. Maury in the cours of the Gulf Stream to be 5,000 fathoms and more, are [illegible]bably vitiated that current, and thus indicate greater depths than

For in obtaining deep soundings where there is a current, three operations are required, each independent of the other, as follows:

First,—*The operation of ascertaining the depth*, by a very fine but strong line, with a conical weight of adapted size.

Secondly,—*The proof that the bottom was reached, and some of it obtained for objects of science*, viz.: by a cylinder or pipe as above described, with a line sufficiently long and strong to bring it up again after it had been down, which can be lowered from the vessel, kept stern to the wind; and to effect which, where there are currents, of course twice the quantity of line should be paid out; or a weight attached at every 200 or 300 fathoms to assist its descent.

And, Thirdly, *The ascertaining the strength of the superficial current*, by a weight sunk in 300 or 400 fathoms or more, and buoyed at the surface, as described by Lieuts. Walsh and Lee of the United States Navy.

For as the line descends so slowly in the greater depth, by reason of its friction through the water, so as at 2,000 fathoms to be little more than one knot per hour, even with a fine twine or silk line, and the superficial current is often in excess of that in the Atlantic and Gulf Stream, the quantity taken out by the current alone will, when the lead has reached the greater depths, then be in excess of the actual vertical descent, and thus give an appearance of there being twice the depth that there really is.

But when the current is ascertained, (which no doubt it should be at every cast, and as I think only superficial currents exist to cause an excess of paying out of line, and not in general "swigging under currents," as they have a uniform effect on the line after the weight has descended below them,) the excess paid out for current can be deducted, and will equal the length of drift, corresponding to the rate at which it is ascertained, and the time occupied in obtaining the soundings.

As a summary of my experience and views, I repeat that obtain correct soundings at great depths, three operations are necessary where there are superficial currents, viz.:

First,—To ascertain their strength.

Secondly,—To obtain bottom by independent apparatus and lines of sufficient strength, by which much more of the bottom can be obtained.

Thirdly,—To obtain bottom with a fine but strong twine, with a conical weight attached so as to offer the least resistance in its descent, and the fact of being down ascertained by weighing the line after it appears to be so, by a sensitive steelyard to show ¼lbs. For the resistance and weight to haul a twine line in by hand, 2,000 fathoms long, as I have shown, equal to about 4lbs., when detached from the sinker, so that after showing so little as 4lbs., if on being hauled taut, or brought so by the current, it should

exceed 12lbs. or 14lbs. before breaking, (according to the weight of the sinker,) the weight must have been resting on the bottom.

In regard to corrections for superficial currents, it must be evident that if the boat was ascertained to be drifting at the rate of one knot from over the vertical position of the lead after it has descended some 200 or 300 fathoms or less, according as ascertained, that for every six minutes the line was running out 100 fathoms would have to be deducted, or 1,000 fathoms for every hour. Or if the sounding was taken in the Gulf Stream, where it runs more than two knots, more than 200 fathoms would have to be deducted for every six minutes the line was running out; and as in a depth of 2,000 fathoms it takes fully an hour to reach the bottom, nearly double the quantity would have been paid out, viz.: 4,000 fathoms—so that this may account for the great depths, viz.: 5,000 and 6,000 fathoms and *no bottom*, which we see in the course of the Gulf Stream on Lieut. Maury's chart. For it seems more probable that a greater uniformity of the bottom exists than the soundings shows. And in advancing this view, I am induced to draw attention to the fact that where there is still water, viz.: in the "Sargasso weed field," we have the least depth shown, an *apparent bank*. But may not this be because the soundings were not so vitiated here by superficial currents?

The subject is as full of geological and geographical interests as it is of zoological and nautical, and being also a new investigation, in which light has only just dawned on us through the scientific labors and zeal of our brothers of the American navy, and being also complicated with some difficulties still, all this must form my excuse for attempting to explain some of them in this long essay.

THE FIRST BRAZILIAN DRY DOCK.—The rising empire of Brazil, which is just now making numerous well-directed efforts to extend her maritime power among the nations, is at present completing its first Dry Dock at Rio de Janeiro. This dock is situated on Snake Island, near the dockyard. It is being excavated out of the solid rock, convicts having been employed for several years in roughing it out. Mr. Henry Law, an English engineer, has contracted with the Brazilian Go[illegible]nt to complete it for £75,000, including the cost of a 40 horse po[illegible] employed in pumping the dock out, there being littl[illegible]bor. The dimensions of the dock are—length, 300 fee[illegible]pth, 32 feet. The dock is so situated that its le[illegible] any desired extent.

THE MERCHANT SHIPBUILDERS' SLOOP OF WAR.

On the 24th day of August, according to advertisement inserted on page 320, proposals for the construction of a Steam Propeller Sloop-of-War by the merchant Shipbuilders of the country, were received at the Bureau of Construction of the Navy Department at Washington. Eleven bidders appeared as follows:—

James L. Townsend, - - -	Newburyport, Mass.
Paul Curtis, - - - - - -	East Boston, "
Donald McKay, - - - - -	" "
Roosevelt, Joyce & Co. - - -	New-York City.
Jacob A. Westervelt, - - -	" "
Wm. H. Webb, - - - - -	" "
James R. Steers, - - - - -	" "
Wm. Cramp, - - - - - -	Philadelphia, Penn.
Birely & Lynn, - - - - -	" "
Vaughn & Lynn, - - - - -	" "
Page & Allen, - - - - -	Portsmouth, Va.

General complaint was made of the brief space of time allowed by the Department—sixty days—in which to prepare plans, &c., but perhaps the fault was rather with the bidders themselves, some of whom took too long time to form a resolution to enter the lists. As it was, few bidders had so far completed their plans as to have them entirely satisfactory to themselves, and in justice to the Department we should add that an extension of time would have been allowed but for the refusal of one of the bidders to sign the application of Messrs. Webb, Westervelt, and Horatio Allen.

On the 25th the Hon. Secretary of the Navy authorized the exhibition of the models. It was a rare sight, and one very creditable to the country. The greatest diversity of tastes were manifest in the designs, but we fear less independence was exercised than was desirable. Many of the models appeared to us so different from the builder's usual style, we could not help thinking they were made to please the supposed taste of the Navy, or of the naval gentlemen who would be called to judge of them. We trust all such have over-shot the mark. The Department will aim to select the best, and will expect the model of a merchant builder to differ from one made by a naval constructor. Indeed, as we understand it, the Department desires to test the advantages of the merchant ship style of model for our ships of war. We therefore trust the Commission will select a model in which the successful points of merchant shipping in the United States are fully and independently developed.

We were surprised to find such great differences as existed in the displacements of the several models, being all made on a scale of ¼ of an inch to the foot, the comparative bulk of each showed but too plainly the wide discrepancies in the calculations from which they were made. The dimensions in length varied from 210 feet to 244 on the load-line, and those of breadth from 40 to 50 feet moulded! The displacements probably vary from 2,200 tons to 3,200 tons, while it may be set down that no model of much less displacement than 3,000 tons can possibly answer the requirements. If one below this mark be taken, the ship will most certainly exceed the draught of water and fail to prove equal to the uses set forth in the advertisement. It is well known that the ships built by the Constructors sometimes exceed the draught of water set down for them, and this because they have too contracted dimensions. The country will hold the Commission responsible for the selection they shall make as regards the displacement. There are models before them that are entirely too small, and others that are large enough.

According to the best information we have, the prices for constructing this ship will vary from $300,000 to $520,000—the lesser amounts being bid for the smaller models, and the greater for those of the larger size. Perhaps we may set down $500,000 as near the mark, for such as will answer the requirements. We are not far from the truth when we estimate that the prices proposed will be from 10 to 15 per cent. below the amount which these vessels would cost the Government if built in the Navy-Yards.

The Secretary of the Navy has appointed the following gentlemen of the service a Commission to examine and report the model, plans and specifications to be adopted;

Commodore Charles Stewart; Captain G. J. Pendergrast; Oommander Henry J. Hartstene; Francis Grice, John Lenthal and Samuel T. Hartt, Naval Constructors; Jesse Gay, Samuel Archbold, and George Sewell, Naval Engineers.

Now that the models and plans are fairly before the Commission appointed by the Hon. Secretary of the Navy, it may be well also to examine the questions which will be most likely to perplex those members of the Commission whose province it is to determine which is the best model. The importance of a correct decision, both to the Government and to the private shipbuilders, in addition to the extreme solicitude of the Hon. Secretary, renders it necessary that all the lights, both of science and experience should be brought to bear upon this interesting problem. The limited practice in modelling vessels had by the Naval Constructors, and more particularly in those of light draught of water, renders their position peculiarly unpleasant, now that the opinions of some of them are known to be, that it is impossible to secure the requirements of the advertisement

within a draught of 16 feet water, for the reason that if large enough to carry the required battery, equipment, and stores, they would draw too much water; and if the size were reduced to come within the draught, they would be thrown out for want of capacity. There is neither logic or indicated scientific knowledge in such conclusion. We hope that none of the bidders were influenced in the selection of principal dimensions by these opinions. They are only valuable to their possessors. Nor should they have been governed by the dimensions selected by the Chief of the Bureau for the remaining number of sloops to be built in the Navy Yards, inasmuch as they are intended to draw 18 feet water; and for that draught the dimensions would not be far astray, in the length and breadth—230 feet long 43 feet wide—but as they would be too deep by 2 feet, a proportionate increase of the other dimensions becomes necessary in order to obtain equal displacement.

Some of the constructors have misgivings in reference to the stability and ease of wide vessels. Their fears are groundless. These qualities have more direct reference to the distribution of displacement, weights and cargo, than to principal dimensions. The whimsical notions that are sometimes met with on this subject may well be entertained by persons who have never been to sea in vessels of liberal breadth and moderate draught of water. The easiest-motioned and most stable vessels in the United States are found among those which have the greatest breadth with the best developed bottom and bilge. On the contrary, where great breadth and area of load-line is combined with great dead-rise, an uneasy, rolling, unstable vessel is always to be found. This type of wide vessels, we agree, should be repudiated by every navigator and shipowner. They are not only unstable, but unprofitable and dangerous, particularly for war vessels in rough weather. The amount of stability as computed in such vessels by the formula in use by naval architects is too great—the theory being at fault—as is proved by the quantity of ballast they are compelled to carry, although showing a higher *meta centre* than vessels of the description we have cited, which carry no ballast. The reports of sea-qualities of many of our ships-of-war describe them as "rolling deep—but easy," the qualification too often appearing to answer the purpose of apology. No stable ship will habitually "roll deep," and no deep rolling ship is sea-worthy. The navies of Europe and the United States have lost some of the choicest spirits that ever walked a deck, from mid-ocean disasters to deep-rolling ships—"easy," but unsafe, bottomless and laborious. Why not have a stable ship, to roll but little and that little easily. However, we have confidence in the Commission, containing, as it does indisputably, some of the best talent in the United States Navy.

THE EXAMINATION OF A BRITISH NAVAL STANDARD COMPASS.

We publish the following Instructions of the Superintendent of the Compass Department of the Royal British Navy to show the exactness used in testing standard compasses in that service:

Every standard compass is to be tested at the Compass Observatory, with the means there provided, before it is sent into store, or supplied to any of her Majesty's ships; and according to the Admiralty order, no Standard Compass is to be issued a second time to any ship without having been re-examined at the said Observatory.

The following items belong to each standard compass, and which are here mentioned in order that every part of the instrument may undergo a proper examination:—Compass Bowl, with its Stem, Lifter, Glass Cover and Centre Pin; Card A, with its compound System of Needles, spare Cap, and 4 sharp pointed Pivots; Card J, with its Speculum Metal Cap, and 2 Ruby Pointed Pivots; Aximuth Circle, with its Verniers, Vanes, and Prism; Tripod and Arms; Magnifying Glass; Agate Bead, and spare Hair Line.

COMPASS CARDS—THEIR NEEDLES AND ADJUSTMENTS.

1. The magnetic power of the compound system of needles is to be ascertained with the deflecting apparatus, and the results are to be registered in the book provided for that purpose. The said power of these needles is likewise to be ascertained whenever a standard compass shall be returned from Service afloat.

2. The angles of deflection, date of examination, together with the mark and number of the instrument are to be written on the under side of the card, and the letter or distinguishing mark of the card is to be placed near the centre on the upper side. No part of the needles or card (when on its pivot) is to touch the sides of the bowl when it is inclined in any direction, and a proper width is to be given to the cap, which is to be proved by inclining the bowl till the rim of the card touches the glass cover.

3. The needles are to be straight and properly hardened, and they are to contain the requisite degree of magnetic power. They are also to be placed parallel to each other upon the card, and are to be correctly adjusted to the magnetic meridian, which is to be ascertained by means of the magnetic collimator, edge bar needle, and transit instrument; the pivot of the compass being brought into the line of collimation, a rd placed upon it without the glass cover.

4. Be it observed, that the magnetic meridian is to be asc e

time of examining each compass, and the line of collimation with the pivot is always to be proved to coincide with it.

5. The cards are to be free from distortion, (it being clearly understood, that the impressions are to be taken off *after* the paper has been cemented to the mica which is to approach close to the edge of the card,) the graduation, figures, and letters being well defined, and the needles securely attached. The cards are likewise to be properly balanced, having the necessary sliding weights attached, to adjust for change of dip.

6. The point of suspension of every card is to coincide accurately with the intersecting point of the axes of the gimbals, and each card, when placed upon its pivot is to be examined as to its centering, so that the graduation may be concentric with that on the arc of the azimuth circle.

6. This centering is to be proved by placing the nonius of the verniers at 360°, 180°, 270°, and 90°, of the azimuth circle successively, and ascertaining if the quadrants of the card correspond, or the observations may be multiplied in the intermediate spaces on any additional number of degrees. During this operation the bowl should be clamped when level, and the card perfectly at rest.

8. The cards, when placed upon their respective pivots, are to be free from lateral motion, and return to the meridian after vibration, which will prove whether the inner apex of the cap and the point of the pivot are properly formed.

9. The name of the maker is not to appear on the upper surface of the card, but it may be placed underneath close to the centre.

10. The ivory pin in the glass cover (when screwed down) is not to touch the collar nor impede the free working of the card.

11. Each card is to be deflected and its return to the meridian noticed and registered.

12. The caps of the cards are to be examined through the Microscope, to see that the rubies, or agates, are well-polished, and that they are made to suit their respective points.

PIVOTS, &C.

13. Each pivot is to be tried separately with its appropriate card, to ascertain if they all work freely, and they are to be examined with the agate bead upon the pivot to see that any violent motion of the card may be checked before its rim touches the under surface of the glass cover.

14. The agate bead is to be tried with each pivot direct and reversed.

15. All the pivots are to be scrutinized separately through the microscope, and are likewise to be screwed into the stem of the bowl successively, and their several cards tried upon them as before described.

AZIMUTH CIRCLE, VERNIERS, VANES AND PRISM.

16. The verniers of the azimuth circle are to be accurately adjusted, which is to be proved by turning them round the circle, and noting if they correspond in their "readings" at opposite points.

17. The vanes are to work freely, and they are to be strictly perpendicular, they are likewise to collimate with the pivot in the bowl.

18. The prism is to be proved to be in adjustment by directing the hair line of the Vane to the division on the distant mark, indicating the precise direction of the magnetic meridian at the moment of observation, when, if the prism is in adjustment, the hair line will be found to coincide with the zero of the card, the pivot, as well as the card having been previously proved to be in the correct line of collimation, by means of the magnetic collimator and transit instrument, before the application of the glass cover and azimuth circle.

METAL OF THE BOWL, &C., IF FREE FROM MAGNETIC INFLUENCES.

19. The metal of which the instrument is made, (the bowl, azimuth circle, &c.) is to be proved to be free from magnetic influences, which may affect the accuracy of the observations, and this is to be effected by approaching the metal very near to the magnetic collimator, and observing if any disturbance be produced; and it is further to be proved, with the compass in its place, by taking the bearings of the meridian mark, with the lubber line of the bowl, successively at north, east, south, and west, and when necessary at any intermediate points.

20. The bearings being obtained when the card is perfectly at rest, in each position of the bowl, they are to be carefully registered in the book kept for the purpose.

FORM OF REGISTER.

21.

Direction of L. Line	Bearing of Magnetic Meridian Mark for the time.	Bearing after Vibration.
N.	....	....
E.	....	....
S.	....	....
W.	....	....

GIMBALS, &C.

22. The arms and bushes of the gimballs are to work freely, and out any lateral motion, and the intersecting point of the axes is t cide with the point of suspension of the card.

COMPASS BOWL.

23. The lubber line of the bowl is to collimate with the point of the pivot, when the vanes are used, and the bowl itself is to be carefully made, perfectly cylindrical, and accurately balanced. It is also to be tried with the standard guage, to ascertain that the proper size has been attended to by the maker, and that the pins, for the notches in the verge, and azimuth circle, are in their places. The arms of the gimbals are to be secured with small screws, to prevent them from working out by the constant motion of the bowl when in use.

24. The arms and bushes are to be of hard bell metal, and the bowl itself of pure copper, and it must pass through its Gimbals.

LIFTER.

25. The lifter is to work freely, without any jerking motion, and to lift the card horizontally off its pivot.

TRIPODS, BOXES, PACKING INSTRUMENTS, &C.

26. The boxes and tripods are to be in good working order, they are to be made of well-seasoned mahogany and varnished, and all the pieces of wood which are used in the several cases, are to be attached by copper screws, or pins.

27. The prescribed mode of packing and preserving every item belonging to each instrument is to be carefully attended to.

QUICK WORK.—The burnt bridge on the Central Railroad has been rebuilt, and trains were to pass over it to-day. A note from Mr. Stearns, the Superintendent, says the bridge was 580 feet long and 70 feet high, resting on two stone abutments and three piers, Hows' plan. It was burnt on Saturday night, May 10, and but eighteen working days have passed from the time it was burnt, until the cars passed over it. Of these, it rained excessively five days; the workmen lost fully equal to about four days, leaving but fourteen working days to reconstruct it. One span of 150 feet is built on Hows' plan, the balance with heavy trestle-work made from timbers fourteen inches square, taking over 200,000 feet of timber, every stick of which had to be ordered and sawed after the bridge was burnt. It was fortunate for the Company that saw mills of large capacities are established along their road.—*Newark Daily Adv.*

CAVENDY'S INSTRUMENT FOR ZENITH OBSERVATIONS.

Captain Edward Cavendy, of the United States Mail steamship *Washington*, has just brought out an important nautical instrument which he has had under consideration for many years. His instrument for taking zenith observations in hazy or foggy weather, appears to give perfect satisfaction to all who have examined it, and is now patented in Europe and America. It may be described as follows:

A perpendicular metallic tube is supported by a tripod on a universal hinge, or gimbal, so as to keep it in a vertical position with its point constantly to the zenith. Through this tube the position of the sun is ascertained at meridian, and by the angle found between it and the zenith the basis for correct calculations is obtained. The use of the quadrant after the usual mode, requires a clear horizon, while by Captain Cavendy's instrument, the zenith is substituted for the horizon, and the sun is brought there instead. To get the latitude and longitude by this new instrument, a quarter of the earth's circle, or ninety degrees, is taken, and the angle of observation deducted therefrom, and there is no error to be allowed for.

This instrument is expected to be of great value in foggy weather when the horizon is obscured, but the zenith open to view, as is generally the case.

On the last return trip of the Washington to this port, she was sailed five days this side of the banks without any observations whatever being taken other than by the rough instrument which was originally made by the carpenter of the ship, to test the utility of the invention; the weather was foggy and heavy, and upon clearing up so that the usual observations could be again taken, the ship was found within a mile of Fire Island, the point for which she had been headed.

The instrument has been tested by a large company of nautical men who recently repaired on board the steamboat *Mazeppa*, chartered by Captain Cavendy to make a trip outside of Sandy Hook for that purpose. The following resolutions express the opinions of those present:

"*Resolved*, That the company on board the steamer hereby express their unanimous satisfaction of the demonstration of the utility of Captain Cavendy's beautiful invention for ascertaining the latitude and longitude in foggy weather, that the principle of its construction is scientific, and its operation is perfect; that they have this day compared it with a number of horizon observations, and its accuracy has been proved. They have compared it with the well ascertained latitude and longitude of Sandy Hook, and verified its correctness.

"*Resolved*, That this meeting unanimously recommend to all shipowners to procure Captain Cavendy's tripod for zenith observations, feeling certain that by its use the security of ships at sea will be promoted and navigation greatly facilitated."

GOVERNMENT TESTS OF THE CORROSIVENESS OF AMERICAN IRON.

We are pleased to observe that the Treasury Department is about to institute a series of experiments to ascertain the best kinds of iron produced in our country, to withstand the corrosion of oxygen. The following circular explains the purpose of the Department. We publish it in full:

Treasury Department, August 31, 1857.

Sir,—This department has been furnished with undoubted evidence that there is a great difference between iron from different mines in the United States in the degree and rapidity with which they become oxydized. Congress during the last session, appropriated the sum of $2,500 to test the different irons in this country in that particular. If these experiments shall establish the important fact that we have irons entirely or nearly proof against the corrosion of oxygen, it will multiply the uses of such iron to a very considerable extent for purposes for which it is now applied, and give it the preference over other irons for many purposes for which iron is now used.

The very large extent to which this material is superseding the use of wood and stone in the public buildings, erecting at a cost of many millions of dollars annually, under this department, renders it of the greatest importance to know what irons resist for the longest period the action of oxygen. It is hoped that the great interest the iron masters have in the result of this experiment, will be considered a sufficient apology for requesting samples of their iron, and the ores from which they are made.

I have therefore to request that you will forward to this department, by mail or express, two or three small samples of iron, and a sample of ore, from each of the mines worked by you—the samples of iron not to exceed a quarter of a pound each, and the ore not to exceed a half pound in weight. I would also request information on the following points, viz.:—The extent of the ore deposit—facilities of mining—its distance from furnace, and distance of furnace from market, and mode of transportation thence—the fuel used—relative cost of charcoal, coke, crude, bituminous and anthracite iron—kind of flux, and its cost, &c.—the capacity of the establishment and the amount of iron produced during the last year, and what it would be capable of producing under a ready sale and remunerating price—any peculiarity of the iron produced—whether there are rolling mills in the vicinity and what description of iron they roll—to what purposes most of the product of your furnaces are applied and what description of iron the establishment most produces—when did your works first go into operation—what has been the annual production, and what the ruling prices each year since your works were first started. You will please give the

State and county in which your iron mine is situated, and the distance your fuel is transported. As it is the intention of the Department to furnish you with the result of the experiments, you will please name the post office through which to address you. If you know of any one in your neighborhood interested in the iron business, who does not receive a copy of this letter, if you will forward his address, one will be sent to him. You will realise the value of the information when you reflect upon the growing importance of the iron interest of the country—a fact attributable, in no small degree, to the introduction of iron as a substitute for other materials in our public buildings.

The policy of affording encouragement to this great interest, by promoting its production and increasing its consumption, has been commenced by the government, and I am desirous of obtaining all the information which can be had on the subject, with a view to its further development.

This circular will be addressed to persons not immediately connected with iron establishments, as it is believed that there will be not only a willingness, but an anxiety on the part of every one to advance the object which the Department has in view.

I am desirous of obtaining the information asked for at the earliest practical moment. Very respectfully your obedient servant,

HOWELL COBB, Secretary of the Treasury.

A RUSSIAN STEAMER TO BE BUILT IN EAST BOSTON.—We understand that PAUL CURTIS, Esq., one of our most successful shipbuilders, has concluded a contract to build a steamer of 720 tons for the Russian Government. She is to be built of the very best material, and we have no doubt that she will add to the high reputation of her builder, and reflect credit upon the mechanics of East Boston. Her machinery is to be built at the Atlantic Works, in East Boston, and the enterprising proprietors of that establishment have contracted to have it in the steamer in forty days after she is launched, which Mr. Curtis intends shall be inside of three months. The Atlantic works built the machinery for the Egyptian war steamer *Voyageur de la Mar*, which was built at East Boston, and which is the largest iron steamer ever built in this country.

IN NEW-YORK.—WM. H. WEBB is constructing a sister ship for same Government, and is also preparing to place on the stock a first steam propeller frigate.

FAILURE TO LAY THE ATLANTIC TELEGRAPH CABLE.

THE grand inter-national project of uniting the Old World with the New, by means of an Electric Telegraph Cable, has suffered failure through incompetent management, and thus has fallen, at least for a time, the elevated hopes of Europe and America. At a distance of 265½ miles from the Irish coast, and when 335 miles of the cable had been payed ont, 130 of which was in water varying from 1750 to 2050 fathoms in depth, it parted. We herewith publish the Log of the Niagara, as it furnishes a more full account of the laying of the cable than the sophistical Report of the Engineer of the Telegraph Company, while we make such extracts from the latter as will show his want of knowledge and incapacity for the great work to which he was appointed exclusive master.

It will be borne in mind by our readers that some of our countrymen—gallant and intelligent spirits who do honor to the service of the United States Navy in the exercise of their genius and the forecast of true science—originated this project of uniting the hemispheres; they first proved the practicability of laying a sub-marine cable on the bed of the ocean by determining the depth of the sea, and the character of the bottom. Until they investigated the subject, and brought their practical minds to bear upon it, the world did not dream of the possibility of spanning the ocean with a wire. Mankind knew no more of this subject than of the mysterious depths which these philosophers were the first to fathom out, revealing the wonders of the bed of the sea. The world was delighted with the knowledge obtained. The invention of the Telegraph itself, was previously due to the lively cogitations of an American mind. Why then, we inquire, have not some of the gifted men who originated, fostered and developed this idea of the Ocean Telegraph, been called to carry it into execution? A stock company—an international monopoly—want all the credit of the enterprise. We find this project given forth to the world, and immediately growing into favor and popularity; when, lo! this stock company seizes it; the two most powerful nations of the earth engage (on the reputation of the originators of it) to assist the monopoly in its enterprise; the world shouts AMEN! but a board of English Directors *set upon it;* kissing goes by favor, so an English Engineer is appointed to superintend the manufacture of the cable, and to lay it in its berth. Next the finest ship that England ever saw, is commissioned from the United States Navy, to assist in the work; a consort ship is also detailed to attend her. This Engineer, whose sagacity was fully measured when he ordered the cable made by two manufacturers, with a *reverse twist,* to say nothing of constructing it so that the protecting wires afforded no protection in the

line of strength, this man condemns the ship for the work. Better counsels prevail, however, and she is fitted and employed. But no American officer on board is allowed to assume the least responsibility in regard to paying out the cable. Capt. Hudson is ordered to conform to the wishes of the Company's Engineer in every manœuvre of the ship requisite for the work, and not effecting her safety. The work goes on, the staff of assistants attending to the delivery of the cable from the laying machine, give out from exhaustion, an irresponsible employee in the service of this superintending Engineer is placed in charge of the *brakes* by him, at a critical period, while he (the Engineer) goes forward in the ship, one cannot see for what necessary purpose, except to absent himself from the focus of difficulty; *the cable breaks!* With these circumstances in view, the British press declaim that "*the information is sufficient to show clearly that the present check to the progress of the work, however mortifying, has been purely an accident.*"

The fleet return home. An "investigation into the events" leading to the "present pause in the undertaking" is made—much is said of the "sufficiency of appliances"—the "additional arrangements"—"precautions," &c., while congratulations are heard respecting "valuable knowledge and experience gained," somehow and by somebody, "sub-committees"—"future operations," and the "General Board" are named. It is also stated that "*eight or ten days will elapse.*" (Probably.) A review of the abortive trial discloses something about "brakes"—a higher degree of mechanical skill"—"sudden declivity"—"serious magnitude"—"success of the enterprise"—"without strain"—"natural difficulty"—"form of the cable"—"obstacle"—"retarding strain"—"accident"—"expiration of a period," &c., &c.

A part of the Engineer's excuse for the "accident" (?) is, he was "shorthanded." Why were not the intelligent and able officers of the Niagara permitted to relieve the exhausted staff? They would have gladly done so. The result is a fitting retribution for the injustice of the Company. It is extremely doubtful, however, whether the wise Engineer in Chief, himself, could have long delayed the disastrous result; for the difficulties of paying out the cable to such a great depth, under such a low rate of speed, three knots, were increasing at an alarming rate. On the day previous, the continuity, (*alias*, the *copper-conducting wires of the cable*,) was broken, and the enterprise was a failure from that moment, although the continuity became subsequently restored, as we shall explain.

Now that Englishmen (chiefly) have possessed themselves [illegible] but failed to apply it, the wonder is they don't condemn the [illegible] was so clearly defined in the United States, but of which so [illegible] to be understood by them. It would be well to learn from [illegible]

this undertaking, that the genius which *conceives* a work of art, is best adapted to execute it. When the officers of the United States Coast Survey weighed the probabilities of laying a Telegraph Cable across the Atlantic, they considered the matter of its construction, its powers of communication, the mode of laying it, and the season of the year when practicable to accomplish the work and, if undertaken by them, it would have been accomplished without failure. When these officers were set to the work of taking "deep sea-soundings," it was not "undertaken" merely, but accomplished; when the bottom of the ocean was wanted for exhibition, it was reached down for and obtained; and if Sir John Franklin had been searched for by the Grinnell Expedition four years sooner, we have no doubt he would have been found, dead or alive.

The manufacture and laying of the Atlantic Sub-Marine Telegraph Cable should have been left in the hands where it belonged; the original head and hands of this project should never have been seperated; but such is the world, which is itself materially checked in progress and advancement by one class of men converting into stocks other men's ideas; we have had a new and noble steamship fastened to our docks for months for no other reason; steamers superior to any the world has ever seen, are not built for the same cause, and now the Ocean Telegraph project has been disgraced in the hands of incompetent landsmen. We wish it distinctly understood that the head of this great conception as a practical idea, is situated in Washington, while the hands that failed to do it honor in the realization, came from London; and that it is best to employ Americans to carry out American ideas. Stolen honors seldom prove glorious.

LOG OF THE NIAGARA FOR THE SIX DAYS TAKEN IN LAYING THE CABLE.

August 6.—At 5 A. M. called all hands, and hove up port anchor, and got under way. Commenced steaming slowly out of the bay, and paying out cable at the same time. Discovered that one of the flukes of the port anchor was broken off close to the crown. At 7.15 parted telegraph cable, it having caught foul of the machine. Informed squadron by signal. From 8 to noon standing off and on the harbor, under steam, the tug underrunning the cable. Got the port anchor on board. From 12 to 4 the steam tug and Susquehanna's boats at work at cable, this ship standing off and on. At 3.30 stood in and commenced paying the cable on board the steam tug to splice to the end which had been recovered and buoyed, the Susquehanna and Leopard st nding off and on with the rest of the squadron. At 5.30 the Leopard and steam-tug stood in—wind too fresh to splice the cable. At 6.30 came to in 19 fathoms water. From 8 to midnight the Leopard and Cyclops came in and anchored, the Susquehanna and Agamemnon standing off and on.

Aug. 7.—Commenced squally. At 5, A. M., made signal to the Susquehanna and Leopard to send launches alongside. At 5.30 the Willing Mind, with a working party on board, went to the buoyed end of the cable—also two boats from the Leopard and Susquehanna. From 8 to 12, M., the steamtugs and boats attempted raising the cable, but were unsuccessful. At 10 they commenced underrunning it from the shore. At 1 the Willing Mind, as-

sisted by the boats of the squadron, left the ship with the telegraph cable, and proceeded to splice the two ends lying some hundred yards from the Niagara. At 5 the boats returned to the ship, the cable being spliced. At 7 called all hands, up anchor, got under way and commenced paying out the telegraph cable. At 11.30, ship being in 43 fathoms water, and having run out seven miles of the shore end, came to the tapering joint; secured the end of the heavy cable with a hawser to lower it by. The joint proved faulty and parted in the sheaves; renewed the joint and splice, working the ship over the cable to keep it up and down.

Aug. 8.—At 1, A. M, having formed the splice, started ahead again under steam, at the rate of 2½ knots. paying out the cable at the same time. At 4, Great Skellig light bore S. ½ E. by compass, distant about 12 miles, paying out the cable at the rate of four knots; all the squadron in sight. From 4 to 8 all the squadron in sight; at 5 made general signal; up to 8 have paid out 28½ miles of cable. From 8 to noon paying out cable; everything working well; the squadron in sight.

Aug. 9.—Commenced paying out the cable at the rate of 3½ miles per hour; sea smooth; telegraph fleet in sight; from 4 to 8 signalled squadron; at 7.46 ended the quarter-deck coil of telegraph cable; slowed down and eased the bight on the rollers over the forehatch. Went ahead again at 7.57; very squally appearance during the watch, but at 8 cleared up finely; telegraph squadron in position, the Cyclops ahead. At 10.30 performed divine service; paid out the cable at the rate of 3½ miles per hour; at noon the squadron in sight. From noon to 4 made signal to the squadron, telling the number of miles of wire laid. At 5 increased the speed to five knots; everything working well. From 8 to midnight the sea smooth; paying out the cable at the rate of 5½ miles per hour; at 12 the squadron in sight.

Aug. 10.—commenced paying out at different rates, from 6 to 4½ knots. At 6 made signal—cable going out well; wind fresh; considerable sea on. At 10 a bark ahead on the starboard tack, standing to the south. At 10.15 she kept away and showed Norwegian colors. Hoisted our colors and the telegraph flag at the mizen—the Agamemnon, Susquehanna and Leopard following our motions. At 11 the Agamemnon made signal to know if we had any news from the eastward—replied, "Nothing of importance." Took down cable coil on the spar deck; cable going out at the rate of 4 miles per hour. At 1 exchanged data of position with the squadron. At 5.50, while a splice was passing over the wheels of the paying out machinery the cable got foul—stopped the engine and endeavored to clear it; the squadron in sight. From 6 to 8 backed astern to take the strain off the cable. Stopped, and succeeded in replacing it on the wheels of the machinery—started ahead again. At 8.45 the cable slipped off the after wheel. Stopped the engines, secured the cable with stoppers, backed astern, rove it again and started on our course. At 11.30 the electricians reported the continuity broken, in consequence of not receiving a current from the shore for nearly two hours and a half. Reduced the rate of speed to one knot per hour. At 11.35 the cable was reported in good working condition; increased the speed to three knots per hour; a swell from the westward. Telegraph fleet in sight.

Aug. 11.—At 3.45 *the machinery stopped and the telegraph cable parted*, in lat. 52° 29′ 5″, long. 17° 23′ 2″—265½ miles made good. At 4.30, telegraph signal having been made to the squadron, Captains Sands and Wainwright came on board. At 11 Agamemnon sent a boat with a hawser. We sent her the end of the cable on board to splice. The cable jammed on board the Agamemnon and parted. The Cyclops made a signal that she had found bottom at 2,000 fathoms. A heavy swell from the westward. At 12.30 received board the end of the telegraph cable from the Agamemnon, spliced the t[illegible] together and each paid out several miles. At 3 the Agamemnon made signal t[illegible] cable parted." At 3.30 the cable parted near the stern when the ship was st[illegible]

was up and down; at 1.30 the Cyclops and the Leopard, taking Mr. Field, parted company and steered for England; at 5 made fast to the end of the cable a piece of iron weighing about 250 lbs., and paid out astern three miles to test the strength of the wire. This piece of cable was towed astern for about eight hours, resisting all the strain upon it during the time.

We will now review this barbarously treated enterprise, with a view to point out a *few* of the manifest errors and absurdities which have been developed in the manufacture and laying of the cable. Our readers will find in the *Nautical Magazine* for June, 1857, page 205, a most able and interesting scientific paper on the "Ocean Telegraph," by Lieut. Brooke, U.S. Navy, which discussed the subject in its true light. It is gratifying to observe that in all respects, the theory there set forth, has been verified. It shows that neither mysterious nor insurmountable obstacles exist to oppose a successful result. Indeed, the circumstances attending the operation of laying the cable, its back-set, the necessity and danger of checking it, the breaking of the continuity, and finally of the cable itself in a certain specified contingency, which actually happened, were clearly indicated. The intelligent reader must have perceived plainly fore-shadowed the inevitable "accident" which occurred. The mysterious currents which the (British) Engineer deemed to carry away the cable in deep water, causing him to bear harder on the brakes in order to check its dangerous rate of running out, existed only in his imagination—the deep sea soundings of the locality proving them to be fictitious—but this misunderstood phenomena was the back-set of the cable, or in other words, the sinking of it in the line of its inclination, from the ship to the bottom—sinking endwise being easier than sidewise—in consequence of too slow a rate of speed, and paying out. Lieut. Brooke wrote, "we must take into consideration the fact that the cable is to a certain extent, to be dragged laterally through the water; the resistance from this source will exhibit itself in the sliding astern, or back-set before alluded to. *It is this tendency of the cable to run in the direction of inclination, which will render the operation of laying it difficult.*" "It is evident that while this action tends to waste the cable, it will more than supply the demand of the current," (meaning a current athwart the course of the cable). "This backset, which, with a heavy cable, [such as the one used,] presents the most serious obstacle, *with a lighter one becomes an element of success.*"

Philosophy teaches that three leading conditions must be considered in laying the cable: these are the depths of the water, the weight of the cable when immersed, and the speed of the ship. The weight of the cable should be proportioned to the depth of the water in inverse ratio—the deeper the lighter—and the speed of the ship adjusted to the joint result.

Should the cable not differ in weight as the depth altered, then, obviously the speed of the ship should be regulated solely with reference to the depth. This is the indication of the cable itself, as was proved but too well. To illustrate: if the present cable can be paid out safely, at the rate of three knots per hour, in 500 fathoms, it requires to be paid out at the rate of twelve knots in 2,000 fathoms—about the greatest depths to be reached—or four times as fast for four times the depth. If this would be too rapid for safe delivery, then means must be adopted for *checking* this rate and modifying the manner of sinking—and we here would recommend the presentation of a *leather medal* to the Bright inventer of the "brake," as applied on board the Niagara to effect this purpose. Before the Telegraph fleet left the Bay of Valentia, it was proved to be a fatal machine when used to bring a retarding strain upon the cable.

So long as the necessity for this machine exists, and it is used, just so long will we despair of the successful prosecution of the work. If this *desideratum* has to be supplied, let it be done by buoys of India rubber attached to the cable at proper distances apart. They might be made in the form of nun buoys, and be designed for crushing at a depth of one, two, or three hundred fathoms. By this means the back-set occasioned by rapidity of sinking, might be checked for a considerable distance downward, while the buoys, even when crushed, would add largely to the friction.

But the remote cause of difficulty lies in the erroneous construction of the present cable, entirely unfitting it for being laid in the depths of the Atlantic. It is too heavy. What is wanted, in the language of Lieut. Brooke, "is to construct a cable combining the strength of iron, with the lightness of twine, that may be strewn upon the water, to find its way down slowly to the bottom, while the ship runs at her highest rate of speed. Thus the greatest resistance to the descent of the cable may be obtained, and the tendency to slide, away diminished."

Instead of copper wire, there should be tubes used, as affording greater conducting *surface* with less weight, conducting tubes to be filled with water.

The secret of the apparently *anomalous interruption of continuity*, lies in the following paragraphs of Lieut. Brooke's essay:—

"Suppose that the copper and iron wires were straight and parallel; in that case, since the relative ductility of these metals is about as four to five, in favor of the copper, the iron wires would practically bear the strain, relieving the copper; and this without regard to change of form in the core of the gutta percha. But in the present cable, the outer iron wires make two whole turns to the foot. It becomes then a serious question, whether by strain, or the pressure of five or six thousand pounds to the square inch, the core will be compressed or altered in form. The water

penetrating between the iron wires will surround each part of the cable, and on them individually, exert its powers of compression. If the gutta percha yields, the iron wires will become loose—will extend—and the strain will come on the straight copper, *drawing it,* and although it may yield twenty per cent. of its length without breaking, any such process involves risk."

"The character of the curve assumed by the cable on its way to the bottom, will depend upon the velocity of its descent and the speed of the ship."

"If the cable, when extended horizontally upon the water, sinks faster than the ship runs, the convexity of its curve will be toward the bottom: the upper portion, nearly vertical, will descend more directly, and therefore more rapidly towards the bottom; the lower portion will consequently *be deposited in waves upon the bottom.*"

At the time of stopping the engine on the morning of the 10th August, and backing the ship to clear the cable in the paying out machinery, the curve of the cable assumed a catenary form, (see figure on page 207, June No.,) bringing an immense strain upon it; the interior copper conducting wires broke; the gutta percha stretching with the outer spiral laid iron wires, drew the fractured ends apart, and continuity was of course interrupted. But when this interiorly ruptured portion of the cable reached the bottom, the waves in which the cable was deposited, furnished slackness sufficient to allow the gutta percha, when thus relieved of the strain upon it, to contract, and draw back the broken seperated ends of the conducting wires, and continuity was thus re-established.

The re-establishment of continuity, proved the fact that the copper wires were broken and seperated, and that the gutta percha stretched, but remained intact. Had it not been re-established, the interruption would have been generally attributed to abrasion of the insulating material, and the erroneous construction of the cable might have remained *unexposed.*

On the construction of a sub-marine Telegraph cable, the author of the essay above referred to, remarks—"It would seem preferable to arrange the strengthening and protecting wires straight and nearly parallel to the copper conducting wires, the latter slightly sinuous, and to cover the whole with an external coating of gutta percha, or other similar material, which would bind them together, and prevent their cutting the insulating core, which, as before remarked, sometimes happens with heavy cables."

While we entertain no hopes of laying the present cable, by the hands of the Vandals now having it in charge, we feel assured there are grounds for anticipating the accomplishment of this grand enterprise at no very distant day. It is somewhat gratifying to observe that the Niagara, which was at first pronounced unsuited to the work of laying the cable, is now

admitted to be better adapted to it than any other vessel that could be procured. By the time one or two more abortive attempts are made to lay it, we would not be surprised to hear that the Americans best understand the whole subject, and American officers may then be permitted to share a due proportion of honor in the realization of their own ideas; when the course of the expedition will be reversed, and the cable laid f om West to East—with the run of the sea, the prevailing winds, and the current of progressive thought.

SAILING VESSELS OF LIGHT DRAUGHT WITH BULKHEADS FOR STRENGTH.

To THOSE who have assumed and maintained that wide flat vessels were unfit for sea voyages, the following letter may be of service. The vessel to which it refers was built by the following dimensions: Length, 175 feet breadth, 32 feet; depth of hold, 8 feet; single deck. She was designed for steam propulsion, and was built with one longitudinal iron bulkhead, extending from bottom to deck, and three transverse bulkheads of the same material. Her port of destination was Santa Marta, to run on the Magdalena river, and her engines being those which had been in the Manzanares, were already there; consequently the vessel being buit at New-York, was taken out under sail, with temporary keel of 26 inches deep, to be removed when she arrived. There was prepared a pair of side lee boards, but it being feared she would lose them they were unshipped, and she proceeded to sea as per date, and has made the shortest passage on record, under similar circumstances, and indeed it is seldom equalled by any vessel. For full description see number IV. of present volume.

"BARANQUILLA, JULY 19, 1857.

MESSRS EDITORS:—Sixteen days after leaving Sandy Hook, I arrived in Santa Marta. I would gladly comply with your request to furnish an extract of log, but not having the original with me, please accept my excuse. On the 24th ult., in the morning, I swung ship at Sandy Hook, and proceeded to sea at noon. The minimum points of deviation, strange to say, were the East and West, which were only ½ of a point. The extreme were N.N.W., S. by E., E.N.E., at which the deviation surpassed (in Lat. 40° N.) 3 points, and gradually diminished to 2 points, in Lat. 11° N. The aberration was always to the port side, making the variation westerly when the ship's head was northerly, and easterly when steering south. The vessel was constructed, you will remember, with larboard side to the south. I do not think a person would be far from right in assuming that southern polarity has been acquired by the iron. As a sea-going vessel she even surpa sed my most sanguine anticipations, and although on drawing aside from keel 4 feet, held her wind with the [illegible]

vessels. It was necessary, however, owing to great spread of rigging to come up with fore swifters and topmast backstays.

In the six midship compartments there has been no pump-break shipped since the boat was launched. I remain yours, &c.,

H. ROBINSON."

For the Nautical Magazine.

A NAVAL RACE.

THE SUSQUEHANNA, AGAMEMNON, AND NIAGARA—OR, UNCLE SAM, OLD ENGLAND, AND YOUNG AMERICA.

THE following account of the race between the U. S. side-wheel steam frigate Susquehanna, the British screw steamer of the Line, Agamemnon, and the new American screw frigate, Niagara, has been received at Washington. The Niagara soon evinced her superior model for speed. This circumstance is the more gratifying, as the Agamemnon is said to be the "crack" vessel of the English navy, easily making eleven or twelve knots an hour, while the Susquehanna bears a like reputation in the United States Navy. The circumstances of the race are stated as follows, by an officer on board the Niagara:—

"We had something of a race to-day, and a good deal of excitement for a while. The Agamemnon and Niagara have each large fenders or guards over their propellers. The former has a load of about 1,500 tons, and we now about 1,150, both load and guard not much of an assistance in a race, and besides I was a little afraid of the Agamemnon, as every one declares in England that she can steam eleven and twelve knots easy, and I thought certainly the Susquehanna would lead us badly. In this trim we are. So, with all these reasons, I managed to keep a little back than otherwise. This morning at nine the Susquehanna was about two miles head, and we were just abeam of the Agamemnon. Captain Sands [of the Susquehanna] signalized "I am going to Plymouth," as much as to say I can't wait for such slow coaches. I asked Captain Hudson to let us try and go to Plymouth also. Each ship's smokepipes told the story of hard firing at once. The sea was smooth and the wind light after us—smoke just up and down when at full speed. At 5 P. M., the relative positions were nearly as follows: The Agamemnon was more than hull down astern. We could just see her smoke, and the Susquehanna was about seven or eight miles astern. As Captain Hudson wanted to keep company with the Agamemnon, we stopped and waited for her.

The Niagara's speed was twelve knots in the contest."

We are disposed to find fault with the writer for his want of faith in the

powers of the Niagara; his unbelief stamps him at once as belonging to the party of *Uncle Sam* in the Navy; yet we give him credit for the spirit displayed in the "hard firing" which decided the battle in favor of the "young" branch of the service. When he perceives clearly which is the truly *fast* side of the house, we shall expect his company.

"Uncle Sam" has been beaten, and Old England again eclipsed by the daring Builder of the Yacht *America*. "Uncle Sam" divided the distance between them, occupying at the end of the heat just the ground which we supposed he would—half way between—his blood proved neither hot nor cold, but of that reprehensible, distasteful temperature denominated *lukewarm*. Well, there is another chance of adding to the fleet of Young America in the Navy. The Sloop-of-War Commission in Washington is debating upon the subject of a consort for the Niagara; but whether they will be able to discover the creature, or will approve her looks when found, is merged in mystery.

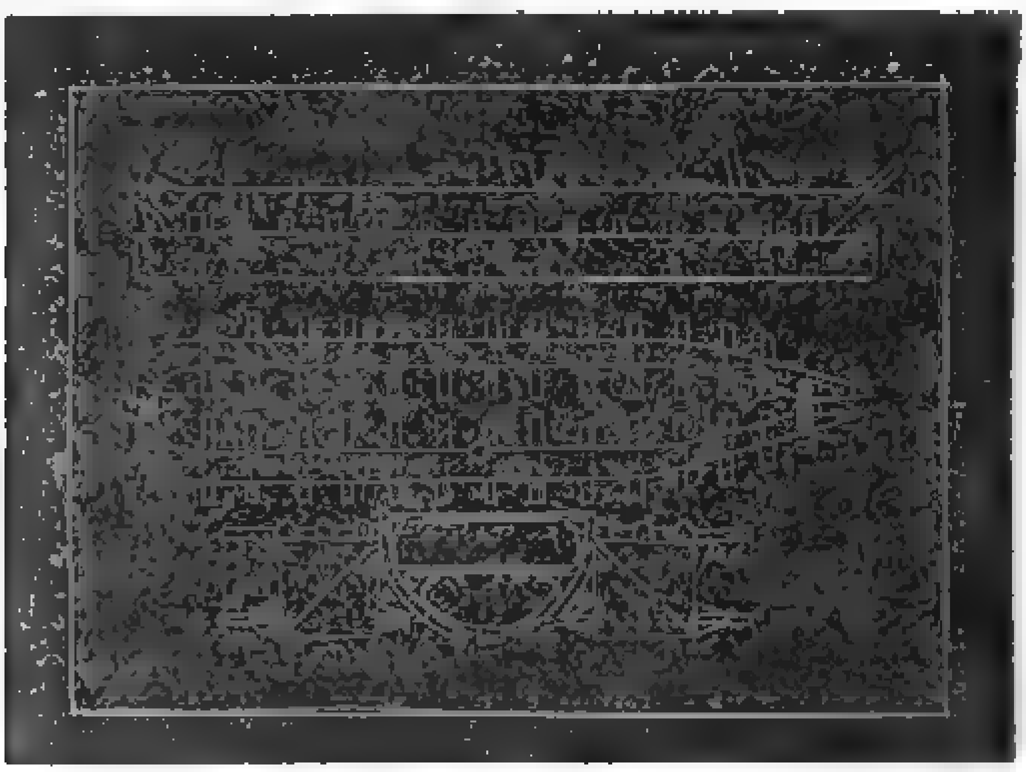
We approve of Naval Races—tournaments upon the ocean. We propose an annual Regatta of the Navies of All Nations. Let the prize be Cuba, Jamaica, Central America, the Sandwich Islands, or half a dozen of some Guano Group. We will stake Mexico against British Asia, with England; the race to be performed in August, 1859. She may enter the Great Eastern, and we will then have our new fleet of sloops afloat, and possibly the projected four-wheeled California steamers. Y. A.

For the Nautical Magazine.

RAISING SUNKEN VESSELS

In a review of the various arts for raising sunken ships, we have found a machine which for power and simplicity supersedes all others, and which when properly carried out, will prove an immense saving to the country, and as a natural result, profitable to its originators. We give drawings of the apparatus, showing its operation, (like to that of a vice,) by which it adapts itself to the conformation of the bottom of any vessel, and grasps it with such force, that no ship, however deeply imbedded in sand or mud, can possibly resist its power of raising it to the surface of the water. It is calculated that this machine will raise vessels from a dep[illegible] 200 feet or more, and the fangs of the machine grasping upon ever[illegible]n of the ship's bottom. there will be no danger of straining her. [illegible]owing is a description of the apparatus:—It consists of tw[illegible]irs, AB, adapted to the general outline of the sid[illegible]or to the outside of the wreck to which they ar[illegible]ng filled

with water to an extent that will depress them to the depth required, are brought around and close to the side of the sunken vessel F to be operated upon; they are then attached and the water pumped or forced out, as may be best practicable, and its place occupied with air, by which means buoyancy may be given to the tanks to an extent that will float or retain in suspension the vessel to which they are attached, DD are adjustable and changeable supports whereby the peculiar conformation of the wreck to which the tanks are to be applied, may be fitted so as to admit of the tanks being brought as close to the vessel as practicable; EE are slides by which the supports DD are made adjustable and which also aid in sustaining the vessel to be supported or raised, EEE are divisions in the tanks whereby their buoyancy may be adjusted to the case required or to the necessary equillibrum or stability of the mass. GG are powerful screws, whereby the taks are secured together, and secured closely to the vessel which is to be raised.



Upwards of ten millions of dollars worth of property are sunk yearly upon the Atlantic coast, and nearly as much more upon the lakes and rivers, the greater portion of which could be recovered by the use of this machinery. In this country of commercial enterprise, there should not be wanting capital sufficient to establish an undertaking apparently so profitable and important, and of such deep interest to the community at large.

All those interested in shipping, would do well to examine into this invention, and underwriters would perhaps be consulting their peculiar interests by encouraging a trial of its utility. The inventor is Mr. Ponton, of New-York. CARLISLE.

NOTICES TO MARINERS.

DANGEROUS SUNKEN ROCK.—The following report, received from Oliver H. Perry, United States Consul at Canton, gives the true position and bearings of a very dangerous rock lately discovered, situated in one of the channels often used by American vessels bound either to or from Canton, Macao and Hong Kong.

H. M's S. Coromandel, Hong Kong, April 26, 1857.

SIR,—In pursuance of your order of the 24th inst., I have the honor to acquaint you that I have, in company with the Master of His Majesty's ship Raleigh, examined the rock on which that ship unfortunately struck, and establish its position to be, by Admiralty chart, lat. 22 2 N, lon. 113 47 E. When on it the following true bearings obtain, viz:—

Gap in the centre of "South White Rock" in line with the right extreme of a small wedge-shaped island, off the eastern side of Lafsami Island, N 33° E.

Highest part of Alehow Island—N 83° E.

"East Chuck-wan" peak, nearly in a line with a small cliff head, the eastern extremity of a bluff island, immediately NW of Chuk-wan—S. 47½° E.

Great Ladrone Peak seen over the western slope of Pakleak Island—S 28½° W, and the south extreme of the Northern Liungnib Island in one with a small knob on the north summit of Woong Island—W 4 N.

It is a small pinnacle rock on which a moderate sea breaks at low water spring tides, and has 9 or 10 fathoms immediately off it, with 7 and 8 fathoms rocky bottom, in the vicinity to the southeastward.

The danger is situate nearly in mid channel between "Pakleak Island" and "South White Rock, being distant from the latter 26 miles, and was, as far as I can ascertain, unknown.

I should recommend vessels not to use this channel until the ground has been more closely examined. I have, &c., WM. THORNTON BATE, Captain.

His Excellency, Sir Michael Seymour, K. C. B.

Notice is hereby given that the Beacon Light (of the Cliff Beacons) ranging with the Stake Light for entering Nantucket Harbor by the eastern channel, will be changed on the 1st of October, from a fixed white to a fixed red, and continue so until further notice.

By order of the L. H. Board,

C. H. B. CALDWELL, Light-house Insp, 2d Dist.

Boston, Sept. 8, 1857.

Capt. John C. Hoyt, agent of underwriters at San Francisco, received the following letter in answer to a request for information concerning the several rocks mentioned:

U. S. COAST SURVEY, STEAMER ACTIVE, San Francisco, May 18, '57.

"DEAR SIR,—Yours of the 15th inst., asking for a description of certain dangerous rocks in this bay and vicinity, is received.

In reply I would state that "Blossom Rock" lies about a mile from Alcatraz Island, and in the direction of Yerba Buena Island, with but five feet of water on it as mean low water. One hundred and sixty yards to the eastward of Rincon Point there is another rock with but eight feet. "Invincible Rock" is about half a mile to the southward and westward of the Brothers, near the entrance of San Pablo Bay, and has eight feet of water on it. All the above-named rocks are isolated, having but a s[illegible]inted surface, and could, I should think, be removed by blasting, and at a trifling co[illegible]mission Rock" is in Napa Straits, near the Navy Yard. This rock barely sho[illegible] mean low water; its surface, however, is somewhat extended when the low[illegible]es occur.

Respectfully, I am yours,

JAMES ALDEN,

Comm[illegible]ey, Assistant U. S. Coast Survey.

JOHN C. HOYT, Esq., Age[illegible]nderw[illegible] [illegible] Francisco.

The revolving light, which will attain its greatest brilliancy once in every minute, will be shown from the mainm st of the vessel, at a height of 26 feet above the level of the sea;

Further notice of the position and bearings will be given when the vessel shall have been placed. THORNTON A. JENKINS, Secretary.

Office L. H. Board, Washington, Aug. 18, 1857.

CROSS RIP LIGHT VESSEL.—Notice is hereby given that the Cross Rip Light Vessel, Vineyard Sound, has been repaired and replaced upon her station.

C. H. B. CALDWELL, Light-house Ins. 2d Dist.

BOSTON. Aug. 18, 1857.

Notice is hereby given that the following buoys have been placed in the passage between Cuttyhunk and Penikese Islands, Buzzard's Bay:—

SW side of the Middle Ground, Black No. 1. placed in 18 feet water at low tide.

Whale Rock, Red, No. 2. in 18 feet water at low tide.

Middle Ledge R. & B. H S., in 15 feet water at low tide.

Pease's Ledge, Red, No. 4, in 10 feet water at low tide. This is also a starboard hand buoy for entering Cuttyhunk Harbor, where there is good anchorage in from two to four fathoms of water.

Gull Island Ledge. black. No. 3. in 15 feet water.

Gull Island, South Point, black, No. 5, in 15 feet of water. There is a long shoal between this buoy and Gull Island, covered at high water. The channel between these islands is now safe and reliable for vessels of the deepest draught bearing up the Bay or bound for New Bedford. Depth of water from 4 to 6 fathoms.

C. H. B. CALDWELL, Light-house Inspector, 2d Dist.

Boston, Aug. 19. 1857.

BATTERY BEACON, CHARLESTON, S. C.—A fixed light, of the natural color, will be exhibited for the first time on the evening of the 1st. September, 1857, on the eastern end of Charleston Battery, S. C, which with Fort Sumpter beacon, forms a range by which to enter the north channel leading into Charleston Harbor.

The illuminating apparatus will be a sixth order Fresnel lens, placed in a lantern on the top of a cast iron shaft, painted bronze color. The entire horizon will be illuminated and the height of the focal plane 45 feet above low water. which will admit of the light being seen over eight miles above the horizon. GEO. W. CULLUM, Capt. U. S. Engineers.

Charleston, S. C., Aug. 25, 1857.

FRONT RANGE BEACON. SULLIVAN'S ISLAND. S. C.—The Front Range Beacon on Sullivan's Island, S. C., which was burned down April 18, 1857, has been rebuilt, and a fixed light will be exhibited therein on the evening of the 1st September, 1857.

The illuminating apparatus will be a Fresnel range lens, placed in a light-room on the top of a wooden frame, both of which are painted light brown. The arc of illumination is 15°, and the height of the focal plane 50 feet above the sea.

GEO. W. CULLUM, Capt. U. S. Engineers.

CHARLESTON, S. C., Aug. 25, 1857.

MORRIS ISLAND. (S. C.) RANGE BEACON.—A new beacon, ranging with Charleston, (S. C) light-house, has been erected on Morris Island as a substitute for the present brick range beacon, which is out of place in consequence of the shifting of the main ship channel to the southwest. The middle of the new range beacon is 41 feet 5 inches west of the middle of the old one, and with the Charleston light-house in line, correctly marks the deepest water in the main ship channel. It will be lit, for the first time, on the evening of the 10th September, 1857, after which the old beacon tower will be torn down.

The illuminating apparatus will be a Fresnel range lens, placed in a light room on the top of a wooden frame, both of which are painted red. The arc of illumination is 15°, and the height of the focal plane 50 feet above the sea.

GEO. W. CULLUM, Capt. U. S. Engineers.

Charleston, S. C., Aug. 27, 1857.

Two remarkably high chimneys at Lowestoft, nearly in line, NW by W.

The south end of the new hotel at Lowestoft, in line with the north lighthouse on the pier W ½ N.

East Newcome buoy, just open to the eastward of the northeast Newcome, SSW 1 3-4 W.

Notice is also given that, the north end of the Scroby Sand having grown out to the westward, the north Scroby buoy has been moved about a cable's length to the westward of its former position, and now lies in 5 fathoms at low water, spring tides, with the following mark and compass bearings, viz: —

Caistor Mill, in line with the Beachmen's Lookout, SW 3-4 W.

Cockle Light Vessel, NW by N.

Middle Scroby Buoy, S by W ½ W. P. H. Berthon, Secretary.

Notice is hereby given that the Succonnesset Light Vessel, Vineyard Sound, has been relieved by the Light Vessel Relief, and removed to Hyannis for repairs.

The Relief is schooner rigged, with a white ball at each mast head; Hull painted red, with "Relief." in white letters on each side. She will show every night, from sunset to sunrise, one fixed light of the natural color.

When the Succonnesset Light Vessel is repaired she will be re-stationed, of which due notice will be given. C. H. B. Caldwell, L. H. Inspector, 2d Dist.

Boston, July 22, 1857.

Cape Roman and Charleston (S. C.) Lights.—On the evening of January 1, 1858, a first order catadioptric light, revolving once every minute, will be exhibited from the new tower now in course of erection on Cape Roman, S. C., in place of the present fixed light at that point.

The new tower (placed near the present low one of 65 feet elevation, painted with red and white horizontal stripes) is octagonal, built of dark reddish gray brick, and will be 150 feet high when completed.

The light from this tower should be seen, under ordinary states of the atmosphere, from the deck of a vessel 15 feet above the water, about 23 nautical miles, or 17 nautical miles outside of the dangerous shoals off Cape Roman.

This light-station will be readily known during daylight, by the appearance of the two towers, the old one (65 feet high) being painted with red and white horizontal bands, and the new tower, (150 feet high,) from which the light will be exhibited, being of the natural color of the brick, and lantern painted black.

The approximate position of Cape Roman Light-house is:—Lat., 33° 1′ 4″ N. Long., 79° 17′ 5″ W.

On the evening of the same day, (Jan. 1, 1858,) and simultaneously with the exhibition of the revolving light at Cape Roman, the present revolving light at Charleston, S. C., will be changed to a fixed catadioptric light.

The tower is built of brick, whitewashed, and is 110 feet high. The light will have a focal plane of 133 feet above the mean level of the sea, and should be seen under ordinary states of the atmosphere, from the deck of a vessel 15 feet above the water, about 20 nautical miles.

The beacon light, placed at an elevation of 50 feet, in front, in range with the main light, gives the line of best water across the bar.

Approximate position of the Charleston main light:—Lat., 32°, 41′, 55″, N: long., 79°, 52′ 29″ W. Thornton A. Jenkins, Secretary.

Office Light house Board, Washington City. Aug. 1, 1857.

Montauk Point and Great West, or Shinnecock Bay Lights. Long-Island, N. Y.—On the evening of the 1st day of January, 1858, the present fixed light at Montauk Point, at the east end of Long-Island, N. Y., will be changed to a first order catadioptric fixed light, varied by a flash once in every two minutes. And

On the evening of the same day a first order catadioptric fixed light will be exhibited for the first time from the Light-house Tower now in course of construction [illegible] Ponquogue Point, north side of Shinnecock Bay, Long-Island, N. [illegible] water or ocean beach, and about half-way between the Light-hou[illegible] Point, Long-Island.

Montauk Point Light-house.—This Light-house tower is 85 feet high, built of stone, whitewashed, and the light has a focal plane of 160 feet above the mean level of the sea.

With the new first order apparatus, the fixed light should be seen between the intervals of flashes, under ordinary states of the atmosphere, from the deck of a vessel 15 feet above the water, 20 nautical miles, and the flashes (at intervals of two minutes) from three to five miles farther.

Approximate position of Montauk Point Light-house:—Lat., 41°, 4'', 13' N.; long., 71°, 51'', 6' W. 32½ nautical miles to the eastward of Great West Bay Light-house.

Great West, or Shinnecock Bay Light.—This Light-house tower will be 150 feet high, built of brick, and the light will have a focal plane of 160 feet above the mean level of the sea, and should be seen under the ordinary states of atmosphere, from the deck of a vessel 15 feet above the water, 20 nautical miles.

Approximate position of Great West, or Shinnecock Bay Light-house:—Lat., 40°, 51' N.; Long., 72°, 30' W.

35 nautical miles to the eastward of Fire Island Light-house.

J. C. DUANE, Lieut. of Engineers.

Engineer's Office, 3d L. H. Dist., New-York, Aug. 1, 1857.

VARNE SAND, OFF FOLKSTONE.—Official information has been received at this office that, pursuant to the intention expressed in the advertisement from the Trinity House Corporation of London, dated 20th January last, a large spiral buoy, colored red, and surmounted by a staff and ball, has been placed in 12 fathoms at low water spring tides on the NW side of the Varne Sand, and to the westward of the shoal st water, with the following marks and compass bearings, viz:

Paddlesworth trees, in line with a white hotel at the east end of Folkstone Cliff, N by W ½ W. South Foreland high light-house, NE by N, distant 10 miles. Dover Castle, NNE, distant 9½ miles. Dungeness Light-house, W ¾ N, distant 14 miles.

Masters of vessels, pilots, and others are cautioned not to cross the Varne Sand within two miles on either side to the northeastward or southwestward of the above named buoy.

THORNTON A. JENKINS, Secretary.

Office L. H. Board, Aug. 1, 1857.

A FIXED LIGHT, VARIED BY FLASHES, AT PRINCESS BAY LIGHT-HOUSE, LOWER BAY, NEW-YORK.—The present fixed white light, at Princess Bay Light-house, on Staten Island, in the Lower Bay of New-York, will be changed, on and after the evening of the 15th day of Nov. next, (1857,) to a fixed white light, varied by a short eclipse and brilliant flash once in every two minutes.

This distinction will prevent the possibility of mariners mistaking (on approaching the bar at the entrance to New-York lower bay) the Princess Bay light for either of the range lights on Point Comfort, N. J., or those at Elm Tree and New Dorp, on Staten Island. A NW ½ W (magnetic) course, made good, from the light-vessel will lead to the mid-channel (black and white vertical stripes) buoy, placed at the entrance to Gedney's channel, on the line of Sandy Hook light-house and Mount Pleasant in range; and a W by N (magnetic) course, made good, from this buoy (running for Princess Bay light-house) will lead through the best water in Gedney's channel until the lights on Point Comfort, N. J., are brought in range, when that range should be followed, if bound around Southwest Spit, or until Elm Tree and New Dorp lights are in range, if bound up the Swash Channel.

A. LUDLOW CASE, L. H. Inspector, 3d. L. H. Dist.

New-York, Aug. 1, 1857.

RATTLESNAKE LIGHT VESSEL.—The Rattlesnake Light Vessel has been replaced in her old position off the Shoal.

Charleston, S. C., Aug. 3, 1857. C. MANIGAULT MORRIS, L. H. Insp., 6th Dist.

The Succonnesset Shoal Light Vessel, having been thoroughly repaired has been replaced upon her station.

CROSS RIP LIGHT VESSEL.—Notice is hereby given that the Cross Rip Light Vessel, Vineyard Sound, has been relieved by the Light Vessel "Relief," and removed to Nantucket for repairs.

The "Relief" is schooner rigged, with a red ball at each mast head, hull painted red with "Relief" in white letters on each side. She will show every night, from sunset to sunrise, one fixed light of the natural color.

When the Cross Rip Light Vessel is repaired she will be restationed, of which due notice will be given. C. H. B. CALDWELL, L. H. Ins., 2d Dist.

BOSTON, Aug 5, 1857.

NEW LIGHT AT THE PORT OF MESSINA, ISLAND OF SICILY.—Official information has been received at this office, that the government of the kingdom of the Two Sicilies has substituted a catadioptric apparatus, producing a fixed white light, varied by a red flash once in every two minutes, for the fixed light heretofore exhibited from the tower of St. Raineri's at Messina.

The light-house tower is about 125 feet in height, square at the base, and the remainder octagonal.

The light will be exhibited at an elevation of about 130 feet above the level of the sea, and from its power should be seen, in ordinary states of the atmosphere, from 12 to 15 nautical miles.

The position of the light is:—Lat., 38°, 11', 30" N.; Long., 13°, 14', 40" E of the meridian of Paris. THORNTON A. JENKINS, Secretary.

Office L. H. Board, Aug. 5, 1857.

CHANGE OF LIGHT ON BLOCK ISLAND, R. I.—A new light-house and keeper's dwelling is to be erected on the north end of Block Island. Due notice will be given of its completion.

On and after Wednesday, Aug. 26, a single temporary light will be shown on the northern sand hill, about ¼ mile north of the present double light, which will be discontinued after the above date. E. B. HUNT, Lt. Corps of Engineers.

BRISTOL, R. I., Aug. 12, 1857.

NUN BUOY ON ALDEN'S ROCK.—A nun buoy, painted black and numbered 3, has been temporarily placed in the position the Alden's Rock Bell Boat occupied, of which notice was given of her breaking adrift from her moorings on the 12th inst.

GEO. H. PREBLE, L. H. Ins. 1st Dist.

Portland, Me., Aug 14, 1857.

JANE'S ISLAND LIGHT VESSEL.—On or about the 20th inst., the Jane's Island Light Vessel in Tangley Sound, will be withdrawn from her station for repairs.

A schooner will be anchored in her place, and the light exhibited as usual.

W. H. MURDAUGH, Lt. U. S. Navy, L. H. Insp., 1st Dist.

Office 5th L. H. Dist., Norfolk, Aug. 17, 1857.

A FIRST CLASS NUN BUOY, painted red, with the letters "W Q S." in white, has been placed in 8½ fathoms water, E by S, distant ¼ of a mile from the shoalest part of Winter Quarter Shoal, off Chincoteague Inlet.

Green Run, bearing from the buoy NW ¾ N, (mag.) distant about 5¼ miles.

Cape Chincoteague, W by S ½ S. EDWARD M. YARD, Light-house Inspector.

Philadelphia, Aug. 17, 1857.

BLACKWATER BANK LIGHT-VESSEL, S.E. COAST OF IRELAND.—Official information has been received at this office, that it is the intention of the Port of Dublin Corporation to cause a light vessel to be placed, on or about the first week in October, about 1¼ mile E 3-4 S of the buoy on the north end of the Black-Water Bank, from which vessel two white lights will be exhibited—one revolving, the other fixed.

Capts. Hoyt & C. H. Baldwin have been appointed to procure signatures to a memorial to be forwarded to the Secretary of the Treasury, Washington, in relation to the removal of the above rocks.

LIGHT ON CAPE MONDEGO.—The Department of Public Works in Portugal announces that a new Light-house, erected on the point of Cape Mondego, will be put in operation on and after the first day of August.

Its position is on the said Cape, lat. 40° 10′ 50″ 06 N., lon. 0° 13′ 41″ 69 E. of the Meridian of Castle St. George. It will show a fixed light of a catadioptic apparatus of the 3d order, 42 metres above the level of the sea, and distinguished at a distance of 20 miles within 240° of the horizontal radius, from 35° NE to 25° SE from the centre of the Light-house.

Vessels steering from N to S along the coast should not lose sight of the Light, after making it.

A Fog Bell has been placed on Cape Forcha, the western point of the entrance to Yarmouth N. S., near the Light house, and strikes seven times in each minute. It is the liberal gift of the owners of steamer Eastern State, running between Boston, Yarmouth, and Halifax, being the amount appropriated by the Nova Scotia Legislature in favor of their enterprise in establishing the communication.

The Newburyport Herald states that the wreck of schooner Pleiades, which was sunk off the Blue Fish Hotel some 4 weeks since, lies directly in channel way, and at low tide there is but a foot of water on her.

BANTER LEDGE BUOY.—A wooden can buoy, 3d class, painted red, has been placed to mark this danger off the mouth of the Damariscotta River. The ledge dries at two thirds ebb, and has regular soundings all around it.

The buoy is 40 fathoms SW by S of the dry part of the ledge, and is anchored in seven fathoms water at low tide, sticky bottom.

GEO. H. PREBLE, L. H. Ins. 1st Dist.

Portland, Me., July 7, 1857.

LIGHT VESSEL, OCRACOKE INLET, N. C.—On or about the first prox. the Ocracoke Channel Light Vessel will be withdrawn from her station for repairs. Notice will be given of her return to her station.

W. H. MURDAUGH, Lt. U. S. N., L. H. Inspector.

Office 5th L. H. Dist., Norfolk, July 16, 1857.

• A NEW SHOAL.—The following is an extract from a letter of Capt. G. V. Jordan, of the bark Lanette, of Saco, describing the shoal on which that vessel was lost on the 20th May, 1857, addressed to R. M. Harrison, U. S. Consul at Kingston:—"The shoal is about 400 feet long and 40 feet wide, forming a new moon, covered by 15 inches of water. No other breaker or shoal in sight. Lat. 16° 21′ N., lon. 73° 40′ W. My chart calls for blue water."

OWERS LIGHT VESSEL.—Official information has been received at this office that it is the intention of the Trinity House Corporation of London to cause the Owers Light-vessel to be removed, in or about the first week in August, about three quarters of a mile SSW 3-4 W of her present position, and into 21 fathoms at low water, spring tides.

Further notice will be given when the vessel shall have been removed.

THORNTON A. JENKINS, Secretary.

OFFICE LIGHT-HOUSE BOARD, July 15, 1857.

Trinity House, London, July 21.

LOWESTOFT AND YARMOUTH ROADS.—Notice is hereby given that in consequence of the north end of the Newcome Sand having grown up, the Stanford Light Vessel has been moved nearly a cable's length to the ESE of her former position into 6 fathoms at low water, spring tides and with the following marks and compass bearings, viz.:

THE U. S. Nautical Magazine AND NAVAL JOURNAL.

VOL. VII.] JANUARY 1858. [No. 1.

COMPOSITION OF NAVAL BATTERIES.

THE comparative values of ordnance used in the navies of the chief maritime nations is a subject of high interest to the people of the United States, as it is the settled policy of our Government not to maintain immense fleets of armed vessels for the protection of commerce and national rights, but to found our hopes of equality in naval resistance to the *individual excellence of our ships.* To assure this quality, it is indispensable that every branch of the service be maintained on the most advanced footing, and nothing be omitted in the construction, equipment, or outfit of the ships, that can contribute to perfect them as machines of warfare. But no part of the service is more entitled to the fostering attention of our government than ordnance and practical gunnery. These are the right hand of victory in the dread hour of battle; and just in proportion as courage, activity and skill are required to render the most complete battery formidable, so is it demanded that our national ship shall be staunch and powerful —swift as the wind when required, and a model for sea qualities.

In view of these considerations, it becomes vastly important that the inventive genius of our countrymen be encouraged to suggest and offer for adoption every aid and improvement that can add efficiency to the Naval service.. It is not sufficient merely to keep pace with the great navies of the world, but absolutely necessary to maintain a position in advance of them in the character of our machines for destructive warfare. That this is the idea of very many officers of the United States service— the idea of the people and some of our statesmen, we are glad to know. It is the live American idea, as well as the settled conviction of distinguished veterans, we have reason to believe, and we are proud to include the present Chief Magistrate of the Union, with the Secretary of the Navy, in the list. We are the advocates of improvement, but would have pro-

posed innovations subjected to the severest trials before adoption; for it is only by changes that progress is made, and by progress that perfection is to be reached. An experimental establishment for testing the utility of inventions should be attached to every Bureau of the Navy Department which could receive benefit from them; they would be found most admirable adjuncts, and should have at their head a capable and industrious officer, selected with a view to fitness for the duty, who should be aided by a corps of assistants. By these means, and these alone, it appears to us, can the Navy of the United States be established in the foreground of improvement with respect to its material. Our present fault is that, with one exception—the ordnance Bureau, we lack these aids to a correct and steady progress, and too frequently take protection under the shield of conservatism against the introduction of novelties originating with visionary inventors;—nay, this abuse of opportunities for advancement is carried to such extent as in almost all cases to exclude the practical inventor from benefitting the service on any terms. The heads of Bureaus cannot be expected to become *patent* examiners to any great extent, while we submit that every invention that enters the precincts of the Patent Office, relating to the progress and improvement of naval warfare, should be determined in terms of utility and known to the Government. Not only so, but many of the best minds of the country avoid naval inventions altogether, because there is no market for them at home, and only a precarious one abroad. This is not as it should be. The proposition needs only to be stated to become apparent to a live American mind, that the inventive genius of our countrymen should be encouraged to contribute towards perfecting the efficiency of our naval arm in every branch.

The course of some Congressmen, not Statesmen, with respect to appropriations for the naval service, cannot be too strongly denounced. By means of a contemptible parsimoniousness they have succeeded in retaining old ships in commission, *the repairs on which would have built new ones;* and it has only been by entreaty that statesmen of correct notions have succeeded for a few years past in obtaining such amounts of money from the general treasury as have prevented the Navy from falling into a condition unfit for use altogether. Why, the entire fleet (and the number in commission is quite insignificant, and too few for our real wants,) requires renewal at least every twelve years. The idea of progression forbids that a ship should last forever by means of a system of expensive and injudicious patching. *Rebuilding* would be a thing unheard of, were a wise economy permitted to the Secretary of the Navy, through timely appropriations for *new* vessels. When he cannot have the money to construct new ships, adapted to the wants of the service and the age, the only course is to rebuild old ones, or forego the uses of a navy entirely.

In the matter of ordnance, the Bureau in charge has made most satisfactory improvement during the past ten years. It has connected with it an experimental establishment, such as we have recommended for every branch of the Service, and is presided over by a most able and intelligent officer. The recent exclusive adoption of 9, 10, and 11 inch shell guns on board the new steam frigates evinces the sound judgment of the Bureau, and no less the enlightened views of the late Secretary DOBBIN.

We are indebted to the excellent work of Commander Dahlgren on "*Shells and Shell Guns*," 1856, for the following remarks on the Composition of Batteries which we extract for our readers:—

COMPOSITION OF BATTERIES.

If naval batteries were restricted to a single description of cannon, it would be as easy to estimate the relative force of ships as of the pieces they carry. But the habitual practice of using a variety of guns for the purpose, produces so much complication that it is difficult to form any reliable judgment of the absolute or comparative power of broadsides. The batteries of English, French, and American ships are composed chiefly of 32-pounders, or their equivalent, the 30-pounder—differing in weight according to the class of vessel, or the order of the tier. With these are associated a limited number of 8-in or 22-cent shell guns.

French Ship Batteries.—The changes that have been progressively made in these are stated in an official document to have occurred in the years 1812, 1829, 1837, 1848, and 1849. In 1812, the calibres were 36, 24, 18 and 12-pounders cannon and carronades. In 1829, it was desired to get rid of the inconveniences occasioned by this diversity of bores, and the 30-pounder was adopted for all batteries, classes of different weights being used according to the capacity of the ship or to the height above water. The 80-pounder of Paixhan was already known and had been tried, but the results were not sufficiently complete to admit of its being assigned a place in the prescribed armament of the fleet. This was, however, found expedient in 1837, and thus the unity of calibre which the French authorities so much desired, and had so nearly arrived at, suffered further interruption. The decree of 1848 increased the number of 22 cent sheil guns, and that of 1849 introduced 50-pounder cannon as a substitute for some of the former; it also suppressed the carronade.

The late regulations are directed to apply to all new ships and to those already built, so far as their construction permits, which not being practicable in all cases will account for the retention of some of the old calibres.

The following tables exhibit in a condensed form the style of armament prescribed by the new regulations:—

1848.		Rate of Ship.				Frigates.		
		1st.	*2d.*	*3d.*	*4th.*	*1st.*	*2d.*	*3d class.*
No. of 22cwt. Shell-guns		16	16	16	16	4	4	2
No. of 30-pounders	Heavy	24	24	22	20	26	24	0
	Light	76	56	48	40	30	22	38
		116	96	86	76	60	50	40
Proportion of Shell-guns		1-7	1-6	1-5	1-5	1-15	1-12	1-20

1849.		Rate of Ship.						Frigates.		
		1st.	*2d.*	*New. 3d.*	*Old. 3d.*	*New. 4th.*	*Old. 4th.*	*1st.*	*2d.*	*3d. cl.*
No. of 22cwt. Shell-guns		10	10	10	8	8	4	2	2	2
No. of 50-pounders		6	6	6	0	4	0	2	2	2
No. of 30-pounders	Heavy	22	22	20	26	20	36	28	2	2
	Light	74	52	46	46	42	30	18	40	34
		112	90	82	80	74	70	50	46	40
Proportion of Shell-guns		1-11	1-9	1-8	1-10	1-9	1-17	1-25	1-23	1-20

English Ship Batteries.—Previously to the war of 1812, the long 32-pounder predominated as the principal piece for the heaviest ships, and in frigates the long 18-pounder. In 1825 Colonel Munro, of the royal artillery, presented to the Admiralty a memorandum detailing his plan of naval armament. He admitted but one calibre, the 32-pounder, in all batteries of which there were to be different classes of weights, so as to adapt them to the several decks and rates of ships. These were the 25 cwt., 42 cwt., and 56 cwt. A commencement seems to have been made in 1829 by casting a number of 32-pounders, weighing 25 cwt., and 48 cwt., and was followed up in the next year by running out the 18 and 24-pounders, of the Congreve and Bloomfield pattern—the weights of which were generally of 33 cwt., 40 cwt., and 41 cwt.

To what extent the regular armament was altered by the introduction of these pieces into service does not appear; but we learn from official documents that in 1837 the attention of the British authorities was drawn to the French decree of that year which made the 30-pounder the calibre of the fleet, with the addition of a small number of the Paixhan 80-pounders, or 22 cent, and that, in consequence thereof, it was decided to reorganize the British naval batteries, which was done in 1839, by adopting the one calibre, 32 pounder, and its classes recommended by Colonel Munroe, adding thereto the 32-pounder, of 32 cwt., 45 cwt., and 50 cwt.,—in all six classes. With these were combined the 8 in. shell guns of 65cwt. and of 53cwt. The casting of the new ordnance proceeded rapidly, so that

in 1848 more than 8,000 new and reamed 32-pounders were available, and about 1,600 shell guns..

These constituents, according to the British Aide Memoire, are arranged in the batteries as follows:—

		Rate of Ship.				
		1st.	*2d.*	*3d.*	*Razees.*	*Frigates.*
Whole No. of Guns		110	92	80	50	50
No. of 8-inch Shell-guns		10	10	12	6	4
32-pounders,	Heavy	50	56	20	22	0
	Light,	50	26	48	22	46

United States Ship Batteries.—The new ships built after the war of 1812, were armed as follows:

	Lower-deck.	*Gun-deck.*	*Spar-deck.*
Frigates,	————	32-pounders.	42-pounders.
Liners,	42-pounders.	"	"

Forming a very simple and powerful system of battery—probably the best of its day.

In 1841 a few 8-inch shell guns (63cwt.) were introduced, generally four on each deck. In 1845 a Board, convened for the purpose, adopted a system having the 32-pounder as its unit-calibre, and added a certain number of light 8-inch shell guns on the spar-deck to those already borne below. The classes of the 32-pounders weighed severally 56cwt., 51cwt., 46cwt., 42cwt., 32cwt., and 27cwt. The shell-guns, 63cwt., and 55cwt., being almost identically the English system.

In 1853 it was directed in future equipment that the light 8-inch shell guns (55cwt.) should be excluded from the spar-decks of frigates and liners, and the number of 8-inch, of 63cwt., on each gun-deck increased, so as to form an entire division of ten pieces. About the same time some of the older frigates were razeed, and received a larger complement of shell-guns.

Thus it appears that the leading principle of the present existing naval armaments is alike in the United States, England and France.

The main element of ordnance power is represented by one calibre—and that calibre is the 32-pounder, or its equivalent, the 30-pounder, the pieces differing in weight according to the vessel or tier of battery where they are to be used, and the heaviest of the classes are similar in the thr[illegible] services, so far as offensive capacity is concerned.

No project has proved more attractive to naval men than that of havi[illegible] an uniform calibre throughout the entire fleet. It has been proposed fr[illegible] time to time without success, until adopted for the French Navy in 1[illegible] In the promptness with which the example was followed b[illegible]

the United States may be recognised the general convictions of the profession in regard to the serious mischief inseparable from the chaos of calibres that prevailed, and the urgent necessity for some measure that would simplify the complex economy of naval ordnance. In a three-decker might be witnessed the extreme phase of the evil—long 32-pounders, 18-pounders and carronades, requiring three sizes of shot and four classes of full charge, with as many reduces as caprice might suggest. All this variety of supply was to be distinguished and selected in the magazines and shot-lockers—circulated with perfect exactness in the confusion and obscurity of the lower passages, to a particular hatchway, then up to the deck, where was placed the gun for which each charge or shot was designed; and this was to be accomplished, not with the composure, deliberation and attention that the nature of the operation itself demanded, but amid all the excitement and hot haste of battle.

The utter impossibility of avoiding mistakes, and the mischievous consequences resulting from their commission at such a time, deeply impressed every thinking mind with the urgent necessity of some reform. The officers knew, from daily experience, that simplicity of detail and arrangement was not only convenient in the affairs of their profession, but was an element of efficiency when celerity and certainty were to be attained by the joint action of masses of men. It was most natural, therefore, that whatever held out the promise of simplifying the complex system of batteries, should be most favorably received by common opinion.

There was no novelty in the project of an uniform calibre. It had often been discussed, and was familiar to most naval men. It may be said, indeed, that they were prepared, at the time, to assent to its fullest development; and had proper use been made of the opportunity, there would have been experienced no resistance of any importance. Unfortunately the remedy was but partial in its character and, like all temporizing measures, only substituted one evil for another.

The cannon of the whole Navy were to discharge shot of one size, and hence the service of the lockers became one of perfect simplicity.* But as the guns, though of one calibre, were to be of different weights, there remained all the diversity of charges, carriages, sponges, rammers and entire appliances that had previously prevailed, attended, of course, by the same troubles of equipment and of service. By way of illustration, let us note the effect of the new and old systems on the battery of a U. S. first class frigate (Raritan and class, built in 1820. The guns designed for such

* In 1821, Paixhan proposed the 36-pounder as the unit calibre of the French Navy but he, too, designated no less than four classes of ordnance for the purpose.

a ship were long 32-pounders and 42-pounder carronades; by the regulations of 1845, these were to be replaced by three classes of 32-pounders—the long, the 51cwt., and the 32cwt., for which no less than seven different charges were prescribed by regulation, varying from 4lbs. to 9lbs. This was certainly not a simplification—it was a mere change in the character of the complication, being a choice between two sizes of shot, with three charges on one hand, and one size of shot with seven charges on the other; thereby abolishing the trouble at the shot-locker but increasing it in the magazine, and the powder division, where, by the way, it is most judicious to impose as little duty as possible of a responsible or discretionary kind, the *personal* of that division being made up mostly of men whose usual vocation in a ship is not likely to give them any clear ideas of the importance of their occasional office at quarters, nor opportunities of improving their information in regard to it.

The complication of equipment was undiminished, perhaps even increased by the new arrangement, for there were three different classes of appliance introduced with the three styles of 32-pounders, in lieu of the two which existed previously; and this evil, though of secondary importance, was still of great interest in many points of view.

The readiness with which the expense and trouble consequent on such a radical change in the armament of the large navies were met, makes it the subject of surprise and regret that the reform was not accepted and carried out in its fullest sense, which is obviously not only one calibre—BUT ONE GUN, FOR ALL DECKS AND FOR ALL SHIPS, to the lowest class whose dimensions render it admissable. But even a graver objection existed to the adoption of the new system by at least two of the three powers. The calibre chosen as the standard detracted from the force of their heaviest ships' batteries.

The lower tiers of French vessels of the line were commonly constituted of the 36-pounder, which is nearly equivalent to our 42-pounder, and this piece necessarily made way, under the new order of things, for the 30-pounder. It is true that the force of the upper decks was improved by removing the 18-pounder and 24-pounder therefrom, and mounting the 30-pounders of corresponding weights in lieu of them. But the melioration of the upper tiers did not necessarily involve a sacrifice of the power of the lower battery. The 36-pounders might have been retained there, and 30-pounders substituted for the 18 and 24-pounders, which would have increased the force of the ship and reduced the existing complication in a degree. There was substantial ground then for the objections of the veteran officers who were opposed to the disuse of the 36-pounder, thus noticed by Col. Charpentier. "Others again having witnessed the advantages of the 36-pounder at a previous period, regretted its abandonme

and are grieved to see it displaced by an inferior calibre, the power of which must be of less intensity, and they insist strongly on the restoration of the 36-pounder."

The English authorities are not chargeable with having impaired the power of their batteries of the line by abolishing the heaviest ordnance and taking a mean calibre as the unit. On the contrary, they actually raised the standard of the heavy ships, by using the heaviest calibre they had. It is true that the memorandum of Col. Munro, which was submitted to the Admiralty (1825) before the French began to remodel their ordnance, (1829,) argued for the adoption of the 32-pounder calibre as the unit, on the ground that it was invested with sufficient power for all naval purposes; but whether this was the motive with the authorities for adhering to that calibre or not, the true principle was followed in taking the heaviest denomination of gun as the unit, retaining the 32-pounder below, and substituting it in the upper batteries for the 18 and 24-pounders—thus abandoning their lighter calibres, while the French relinquished their commanding piece, the 36-pounder; and in this way the lines-of-battle were equalized in calibre, obviously to the great advantage of the English, which previously were of inferior metal.

Admitting, then, the necessity of an uniform calibre in our own service, how was the principle to be developed with reference to existing ordnance? The settled policy of the republic forbade all attempt to rival with numbers the immense fleets of England and France. Therefore the only hope of our navy lay in the *individual excellence of its ships;* to assure which it was indispensable to follow sound principles, and carry them out to the least detail, omitting nothing, however minute, that contributed to a perfect whole. Experience had shown what could be effected in this way, even with means that seemed insignificant; and the commanders whose proud distinction it had been to sustain the flag with honor, coming fresh from the eventful conflict of 1812, gave significant indications of the value they attached to a proper ordnance, when called on in 1820 to determine the armament of the ships that were to be added to the Navy under the "Gradual Increase Act."

The frigates were to be armed with the long 32-pounders below, and the 42-pounder carronades above. Ships-of-the-line had the same, with a tier of 42-pounders in the lowest battery. This, if not the most simple arrangement was certainly less complicated than usual, and the most powerful of the kind at the time of its adoption. The English might, without positive danger, disregard the advantages to be derived from a full compliance with a fundamental principle, however earnestly asserted by one of the ablest writers on ordnance,* for *the possible inferiority of individual ships*

* Simmons on Present Armament of Navy, 1839.

could be compensated by numbers. The French, too, might, if they would, sacrifice power in their naval batteries to some supposed equivalent, notwithstanding the maxims inculcated by their distinguished artillerist;* for the annihilation of her entire navy would not touch the source of the real power of France. But if the United States *would maintain past reputation and present rights*, they dare not organize their scanty national marine on any other but the surest foundation. When, therefore, it became requisite in 1845, to renovate our naval system of armament, it only remained to apply the general principle so well proved by past history. *The power of the batteries was to be increased.* With existing calibres this was only to be done by making the highest (42-pounder) the unit—withdrawing the long 32-pounders from the second deck of liners, and gun-decks of frigates in order to substitute long 42-pounders, but somewhat fewer, so as not to increase the weight of the battery.

Now, however, the advent of a higher element of ordnance power,† overshadowing the pretensions of the 32-pounder and the 42-pounder equally, deprives the question of any practical value; though its consideration is still useful as involving an abstract principle which is applicable to all ordnance.

(To be continued.)

A LETTER FROM CHILI.

The following letter from a valued correspondent, may be of interest to some of our readers:

Valpariaso, July 14th, 1857.

Messrs. Editors,—The steamer "Maule," built in your city for a Tow-boat on the bar of the river of same name, arrived here on the 5th inst.—I went on board on the morning of the 6th, and find her to be an honor to the port she comes from, being well and substantially built, and I have no doubt will perform equal to expectation—always provided such may not be too great—as they speak of twelve miles per hour. She has not yet been tried in this bay; but I think she is too short to make the twelve miles, her length being only 150 feet. I am happy this one has arrived safe, and is so well built, both as it regards her hull and machinery.

There is too little attention paid to our foreign contracts. In many cases a very inferior article is manufactured by contractors, making money be-

* Paixhan.

† The Shell-gun.

ing the object, without any regard to the future credit of the country. Whilst speaking in this way, one comes before me. A year ago, more or less, the house of Consino & Garland, of this city, sent home by Capt. Martin, for a steamer to navigate the River Maule, from Constitution to Talea. The boat was accordingly built (after a model by the late George Steers) of iron, fitted with two oscilating Engines, at the Novelty Works, shipped in pieces, sent out here and fitted up by them for the sum of twenty-five thousand dollars, five thousand dollars forfeit should she not make ten miles an hour. After an unfortunate launch here, she was sent to Maule, and there, on trying her, she could not make head against an *eight mile* current, and of course will be what she is, *a failure.*

For the Nautical Magazine.

BOUCHERIE'S MODE OF PRESERVING WOOD FROM DECAY.

It is now more than fifteen years since the public was made acquainted with Boucherie's mode of preserving wood from decay. In May, 1842 a lecture was given on the subject at the Royal Institution in England. At later periods the matter was from time to time reverted to, especially in 1851, when a figure was published representing the process as conducted on a large scale in the forest of Compiegne, in France. From some cause or other, it has however, made no progress in this country, and until the appearance of a pamphlet on the subject, by the Permanent Way Company, (26 Great George street, Westminster, Eng.) we had supposed that unexpected practical difficulties had presented themselves and stopped the process in that country. In this we were mistaken. It now appears that wood is prepared by Boucherie's method on a very large scale for French railways, and that English engineers are adopting it.

Dr. Boucherie's first idea was to compel trees to fill themselves with preservative substance, by their own natural inbibition, and to a certain extent this was effected. The manner in which fluids direct themselves when sucked in by a growing tree, was however, apparently capricious—some trees, the Ash for example, absolutely refusing to take up the fluids presented to them ; the process recommended was moreover troublesome, except in the case of very small trees, and it was soon abandoned. The next plan was to suspend logs of trees perpendicularly, and to secure a reservoir to the upper end, so that the preserving fluid might by its own weight sink down into the tree, displacing and driving out the sap, whose presence is one of the great causes of decay in timber. This, too, seems

to have been superseded by the present method, which is thus described :—

Soon after the tree is felled, a saw-cut is made in the centre, through about 9-10ths of its section. The tree is then slightly raised by a lever or wedge at its centre, and the saw-cut is then partially opened. A piece of string is then placed round the saw-cut, close to the outer circumference of the tree, the support is then withdrawn, and the saw-cut closes on the string, thereby making a water-tight joint. An auger-hole is then bored obliquely into the saw-cut; a wooden tube is then driven into the hole, the conical end of which is attached to a flexible pipe, which is in connection with a cistern or reservoir at an elevation of from thirty to forty feet above the tree intended to be preserved. In the case of very long trees, the foregoing method is slightly modified. When the timber is under operation, the sap runs out from the ends in a clear stream, showing the amazing quantity of this fluid which it contains; in fact, the preserving fluid will traverse a tree twelve feet in length with less pressure than is required to force it laterally through a plank three-quarters of an inch in thickness.—As the sap is forced out, the preservative fluid follows it, and its presence at the end of the wood is ascertained by a chemical test. Thus the sap and fermenting juices are completely expelled, and the timber impregnated throughout its length with the preserving fluid.

Such is the method of charging a tree, and nothing can be more simple or effectual. The small expense attending the operation, will enable the process to be applied in cases where it has not hitherto been available. It will be economy for all proprietors of land of any extent thus to preserve the timber used on their farms for fencing, buildings, gate-posts, &c.; an advantage they could not enjoy so long as the impregnation of the timber required expensive cylinders and costly steam apparatus.

The possibility of introducing any foreign fluid into trees, expeditiously and economically, being thus demonstrated, the next question is, how far is the durability of timber secured by the operation? Upon this point the evidence appears to be conclusive. There is a report of three French engineers, Avril, Didion, and Mary, published in 1850, relating their observations at Compeigne upon blocks of Beech and Hornbeam, from which it appeared that Beech injected with sulphate of copper eight years before was still perfectly sound, although the same wood and Hornbeam unprepared or injected with other fluids, were for the most part entirely decayed. They further report that they saw several logs of Hornbeam in bark, from 23 to 26 feet long, impregnated with sulphate of copper [illegible] others of the same dimensions which had been left in their natura[illegible] The first on being tried with the axe, proved to be in a state [illegible] preservation, even at the surface, whilst the latter, being affec[illegible]

dry-rot, allowed the tool to sink deeply into their substance. They also caused two trees, of about twele inches diameter, to be sawn across; one had been impregnated with sulphate of copper; the other was in its natural state.

The first was perfectly preserved, except in the centre, where they found a small circular spot of dry-rot not penetrated by the liquid. The second, that is to say the Hornbeam in its natural state, was decayed, excepting about a twentieth part of its section, in certain portions radiating from the centre, in different directions. They also inspected a number of posts for supporting the wires of the electric telegraph on the Northern Railway, and found them in a state of perfect preservation. The engineer in charge of the line showed them one of these posts which was sunk in the Oise in 1848. This post had a splinter partially detached by the stroke of an axe at the water's edge. The splinter, which had been recently separated from the post, had its edge perfectly sharp, and off red as great resistance as it would have done at the time when the tree was felled. The superintendent of the telegraph assured them that the Fir employed on the Northern line had remained in perfect condition until the present day; whereas the Oak posts on the Rouen line had undergone a very perceptible alteration.

Similar evidence is collected as to sleepers for railways. The practical result is that all the telegraphic poles in the French empire are now prepared by this process. The administration had 200,000 on the 1st of January, 1855, and since that time have caused 32,000 additional posts to be provided. The preservation of the posts is rendered complete, although the first were prepared and laid down in the year 1846. French railways are also having their sleepers thus pickled. The Chemin de Fer Du Nord alone, in the year 1846, laid down 80,000 Beech and Birch sleepers; and in 1853, upon examination, these were found in so complete a state of preservation, that the Company immediately ordered a further supply of 300,000. In the South of France large quantities of Vine-props are now prepared by this process.

Experiments show that no fluid answers so well as a very weak solution of sulphate of copper, or corrosive sublimate; but the latter is too expensive. Sulphate of zinc, accetate of lead, sulphate of iron, oil, tallow, rosin, pyrolignite of iron, all have been tried without satisfactory result.

What is most important, is that the poorest kind of timber lends itself most readily to the process, and answers best. Beech, Hornbeam, Poplar, Birch, Scotch and Pimaster, Spruce, Alder, Elm, have been perated on with success. The Heart Oak proved impenetrable. Those kinds of wood which possess most moisture, and, of the same kind, those which have grown in the dampest soils, are most easily penetrated. It follows that the least-

esteemed kinds of timber, and consequently the cheapest, are precisely those which afford the best results when injected with the sulphate of copper. The extent to which this injection goes, will be seen from the following experiment.

The increase in weight observed in wood after impregnation, varies according to its nature, depending on the quantity of air it contained, which is replaced by the liquid. The French engineers give the following examples:

Beech , .	increased	209 lbs.	per 35	ft. cube.
Oak (sappy part only)	"	55 lbs.	"	"
Hornbeam . .	"	46 lbs.	"	"
Birch . . .	"	2 lbs. 10 oz.		"
Poplar . . .	"	70 lbs.	"	"
Alder . . .	"	156 lbs.	"	"
Ash . . .	"	50 lbs.	"	"
Scotch Fir . .	"	127 lbs.	"	"
White Fir . .	"	53 lbs.	"	"

Only one circumstance requires to be borne in mind, which is that the operation depends for its success upon the permeability of the timber operated on, and that all timber is most permeable while standing or just felled. It is therefore desirable that if performed in the summer, it should be immediately before the tubes contract, and if in the winter, in the course of a few weeks after felling.

The refuse trees of a country may by this process be manufactured into durable timber for many purposes, of permanent construction. The time may arrive (not soon in the United States, however,) when Poplars, Willows, and all sorts of fast growing but now perishable trees, will be universally planted with a view to the purposes for which slow-growing hard wood trees are now alone thought suitable.

Had those experiments which were commenced at the Gosport Navy Yard, under the direction of James Jarvis, Esq., several years since, been allowed to proceed, this country would also have contributed largely to the cause of science in this direction. His removal from a post of so much importance by the late Secretary Dobbin, purely on political grounds, is greatly to be regretted, inasmuch as he is so eminently qualified for determining the comparative value of different kinds of timber in a wooden country like this.

FACILITIES FOR CONSTRUCTING SHIPS OF WAR IN THE UNITED STATES.

We find a mistaken opinion prevailing abroad with respect to the facilities for building ships of war in this country which it is desirable to correct. By what sources of information the Governments of foreign countries are guided in the selection of England as a place for the construction of naval fleets *par excellence*, it is not perhaps in our power to point out: but certain it is that a great want of information, or more probably, interested mis-information has caused our ship-builders the loss of much profitable work.

The English system of doing work *slow* but sure, is thought to be preferable to the American practice of doing it fast, but not always well. The difficulty to the foreign customer, lies in his ability to superintend with judgment, or to select honest and faithful contractors who shall discharge their trust with credit to the country as well as profit to themselves. With regard to this matter, the fault does not lie with the shipbuilding fraternity of the United States, if foreign agents prefer to give their contracts to builders who may have built numbers of vessels and become rich, rather than to those who by reason of a better workmanship have saved smaller profits, or none at all, and consequently find cause for dissatisfaction. It has required a sharp practice to carry on shipbuilding and make money in view of the close competition which has prevailed in this business for several years past; whether the builder who makes the largest profits, is the *best*, is for those interested to judge. The most salient fact in the history of improvements in shipbuilding in this country, viewed in a financial phase is this, that builders who have been intent on making money as a chief end of business, have ever been averse to the introduction of *improvements*, while it is notorious that at this day the men who have been foremost in exalting the standard of American ships, and American workmanship, have been very indifferently rewarded by the profits of their business. The reason must be clear to all who think, and the fact will be found undeniable by those who will investigate.

Let the foreign customer in search of a contractor to build a ship, inquire for mechanics who have gained honor to their country by honest efforts to *improve* shipbuilding; employ them, and we will guarantee satisfaction. Indeed, it is due to this class that such preference be made; builders who have made a virtue of necessity by conforming to the copy set by another for them to work by, are illy entitled to favors they never earned.

The principle is reasonable and just, that the sower of the seed should reap the harvest and an equal measure of prudence suggests the propriety

of *distinguishing between money-makers and mechanics* for the designers and constructors of a costly ship. The former class follow the business for the *profits*—the latter are moved by an inherent love of mechanism and art stronger than the cravings for lucre. Such bear the burdens of progress, and may be expected to manifest the greater pride and integrity in their work.

With regard to materials for shipbuilding, it ought to be known that the United States has ample resources superior to any country in the world, but is not so universally admitted as we had supposed. The ancient idea that the English have better timber, is not yet fully exploded—it being said that supplies of *seasoned* timber can be had in England in any quantities. Now the oak grown on the soil of England, will not compare in specific gravity, strength or durability with that produced on the coast of the Atlantic seaboard of the United States, and not only so, but much of the oak used in England, is imported from Canada, and is decidedly inferior even to the European timber. A better quality of oak is found in the Western States, and this is the poorest we have; the lengths are very great, but it is cheaper in the market than New Jersey, Maryland, or Virginia oak, and consequently used to considerable extent by our great shipbuilders. Nevertheless the best white oak in the world is to be obtained in the United States, and sufficiently seasoned for shipping purposes.

Then we have the live oak—a wood that England cannot pretend to equal, whether her forests be searched at home or in the colonies—this famous wood requires no seasoning whatever to fit it for use in ship's frames, for which purpose it is best adapted. Next comes the yellow pine, which for deck frames and ceiling, yields the palm to nothing ever nourished by the soil of any country; like the live oak, it requires no seasoning process to adapt it for use. For treenails, toptimbers and stanchions, the locust stands unrivalled. Red cedar, Hackmatack and our magnificent white pine find their appropriate uses in shipbuilding, and can be better seasoned by kiln-drying than by a long exposure to the air. Hackmatack seasons quickly and shrinks but little—less than almost any other wood; hence its superior fitness for knees. In fine, a study of the woods used for shiptimber in the United States, will disclose their excellence beyond the woods of England, and the same is true of iron. The most inferior bar iron in the world, that we have seen, manufactured for bolting purposes, came from England. The relative quality of American and English iron for this purpose may be appreciated from the fact that the former makes a strong clinch on a ring in the raw state without tempering in the fire, while the latter is altogether too brittle for this test without first annealing; the same is true of the heads of bolts, the American iron requiring no

artificial head, but the bolt of English iron must be ***welded*** to make it firm.

The character of American workmanship *always corresponds to the price and the practice of its performer*, our previous remarks are sufficiently explicit. The gravest charge lies against our machinery, and this we think is groundless in any pertinent sense. The farthest admission the objector can fairly claim, is that it is not quite perfect, and many experiments have been tried on wholesale account that have not been profitable to those involved. But this does not argue against the Engineering skill of our countrymen. We are accustomed to initiate improvements by strides rather than paces, and have given too many lessons in the science of Engineering and machinery to the world to deserve a secondary place in this department of human skill. We have yet to be surpassed by any other people. If some discreditable examples of workmanship can be cited, we must beg to refer them to the causes indicated in the beginning of these remarks. The proper hands for any work under heaven can be found in the United States, and also materials in abundance; but let our customers exercise a wise and just discretion in placing their favors—let them single out our honest and progressive mechanics, and all will be well.

WRECKS ON THE BAHAMA.

From January 1, 1856, to May 9, 1857, forty vessels were lost on the Bahama Banks. Commerce has suffered by these disasters, in seventeen months, to the amount of $2,609,800. Governor Bannerman, in a recent State paper, asserted that a large proportion of the wrecks were the work of design. He roundly asserted that, in a majority of instances, vessels were run ashore by their masters, with the understanding that they should share the proceeds of the wreck with the wreckers; and this practice, he said, was common with American ship-masters. If his statement—founded on official information—was correct, the matter should at once be made the subject of official inquiry by the United States Government.—*Scientific American.*

The above wholesale slander against "American shipmasters" by a British official, should be made a subject of inquiry by our Government immediately, whether the statement is correct or not. We pronounce the grave charge above recited, false—absolutely false—a disgraceful trick resorted to by individuals of a rival nation to damage the American character in foreign countries.

We insist that it is due to the commercial and maritime community, as well as the people at large, to institute an investigation of all the causes of shipwreck on the Bahama Banks. Let our Consul at New Providence take charge of the matter, and see that a vindication is forthcoming, also in "official" shape.

The statements of Governor Bannerman will be news to the Underwriters of the United States, who are supposed to be as well posted through their agents as he can be; but let them everhaul the matter thoroughly.—It will be found, no doubt that careless navigation near the Bahamas, as near Sandy Hook, causes too many shipwrecks; but that the sweeping assertions of the official alluded to, can be true, is simply impossible—to us they bear the mark of absurdity, and disclose only the features of slander.

THE NECESSITY FOR IMPROVED SPEED IN THE UNITED STATES NAVY.

Considerable space has already been given in this Journal to the discussion of speed in our naval ships, but there being room for more, and the necessity for a fresh consideration of the subject becoming apparent, we shall take the liberty of offering our readers a few more thoughts upon this vital topic. The study of naval tactics, as they must be practiced, now that steam has been generally introduced for the propelling power of commercial and naval ships, must convince every citizen of even the most moderate patriotism, that our present Navy is sadly wanting in one prime quality of efficiency, viz.: *celerity of movement.* But while this is true, it affords satisfaction to know that in ordnance and gunnery, we are as far advanced as any other nation. It may be worth while in passing to note the cause of this difference in the relative progress of the ship and her battery. The ordnance talent of our country is ably represented in the officers of the Army and Navy, while the constructive genius of our Architects finds a better field for effort in commercial shipbuilding. The comparative smallness of our Navy, and the old time custom of rebuilding old vessels, instead of constructing new ones, has rendered the service unattractive in this stirring age. The result has been th ... *rements* in shipbuilding have found their origin outside of the Na ... adopted into it requires time, patience, and persuasion, or ... n.

One would think that our Governme ... constructive officers, would exercise policy to encour ... itation as improvers of their art, and thus bring int ... of progressive minds who are habituated to studyi ... profession. We

hope that this course will yet be inaugurated, and a sufficient number of new ships be built every year to afford scope for the mind of a live mechanic. If this policy should unduly increase the number of our naval ships, let the older and more inefficient ones be sold out of the service every few years, and by this course maintain a navy suited to our wants, and one the most efficient on the globe. No more tinkering of rotten hulls, and rebuilding, lengthening, and re-modelling; but sell the old and antiquated ones, and build better, as a packet or steamship owner would do.

In designing a Navy, or any of its ships, the nature of their service is the first consideration. The qualities, power, and character of opposing fleets, or ships, must be examined in detail, and such elements of design adopted as may best secure superiority under the greatest number of possible circumstances. A perfect war-ship should be equal to every emergency; but as this is impossible to obtain in one vessel, various sizes or rates, are to be adopted which by their joint or individual action, shall fulfil all the requirements of naval service. These it may be affirmed are more numerous at the present day than at any former period of the world's history. The introduction of steam, the use of shell-guns of enormous calibre, and pieces of extreme range, with the unprecedented attainment of high speed by clipper ships and mail steamers, all combine to task the abilities of naval men for the production of highly efficient ships-of-war.— Indeed, the effort to keep pace with and become master of the mercantile fleets, is of itself a seige of progress. The mail-steamers of civilized nations to-day defies pursuit and capture on the open seas, by any naval ship whatever. The same may be said of first class clipper ships, except in calms.

No principle can be more capable of demonstration than this, that to every class of enemy a corresponding class or its equivalent, must be opposed. The triune secret of superiority in naval actions consists of velocity, battery and gunnery, and although these may have sometimes answered as compensating attributes, the result has exhibited, even in victory, an unwonted sacrifice of constituents of naval warfare, and in defeat the utter folly of imperfect adaptation to the exigencies of battle and self-preservation. It is to be borne in mind, that the object of an engagement is to damage and defeat the enemy while maintaining our own safety, and it is better to escape than be defeated. Naval economy prefers the capture of a small ship from the enemy, to the loss of our own in battle with one of superior force, and hence the marked efficiency of fleets and ships are shown by the odds against which they contend successfully. If a frigate can cope with a line-of-battle ship, she is incomparably more useful than if a corvette should employ her full powers in a victorious engagement; for this reason

the utmost degree of efficiency should be sedulously cultivated, as it will be found to *pay*. We must opposè speed to speed, battery to battery, and gunnery to gunnery.

Let us consider the probable character of future wars, and the qualities of our antagonists for offensive demonstrations at sea. In case of a brush with England or France, both of these nations possessing a vastly preponderating naval force, it is easy to foresee that our coasts would be menaced by them and our commerce cut off, except to the swiftest of our clipper ships and steamers, which would have trouble enough to escape blockades. Legitimate business being at an end, the offensive one of *privateering* would alone remain for the employment of American vessels. It would be entered into with alacrity, and the mighty arm of steam would furnish power for propulsion. This of itself would introduce a new phase in maritime war. The enemy would no doubt adopt similar measures, when the ocean swarming with hostile shipping, would present an imposing spectacle of barbarian warfare unexampled in history. This condition of things would of itself lead to the extensive employment of cruisers by both parties to the contest. In the beginning of a war, the organization of our ships into fleets could not be prudently attempted; our whole navy would scarcely make a respectable one in view of the superior numbers of England or France, either of which could, for a short time, blockade all our principle ports. With a suitable navy at command, however, and by the assistance of armed steamers to intercept supplies, the enemy would probably soon find the attention given to our harbor and coast defences very unprofitable employment, and failing to bring us to his terms of battle, he would be soon obliged to fall in with the necessity of adopting tactics counter to our own, raise the blockade and meet our ships in single combat. With a small navy it must be our policy to fight an enemy in detail, and never engage except to be victorious. The amount of service that can be performed in this way will be astonishing if we possess ships adapted to this style of warfare, and the occasion ever transpires to test its efficiency.

Another phase of war will be shown when it falls to our lot to take the initiative on an enemy's coast at a distance from home, or on our Great Lakes. It may then be necessary to organize into fleets and adopt the proper style of offense. Line-of-battle ships may then become useful; they may answer for blockading, while as cruisers they could never excel by reason of great draft of water and inferior speed.

To check and annoy an enemy endeavoring to effect an entrance to our ports by ascending the rivers, steam gun-boats and land batteries must be employed; but astonishing as it may seem, no such craft as a modern gunboat belongs to our Navy. We should possess in time of peace at least a sufficient number to familiarize ourselves with their requirements and

uses, and thus carry forward the improvement of their design and construction with the other classes of naval shipping. Then, if emergency should require the employment of such a flotilla on a foreign coast, we would not be found, as now, totally destitute of these important means of aggression, and, like England before she could menace the Russians in the Baltic, be compelled to build a fleet adapted to the service.

For the purposes of immediate resistance to a maritime enemy, the Navy of the United States should be constituted and classified somewhat as follows:

First, an Exclusive Steam Force armed with guns of great range and power, and capable of speed sufficient at least to overhaul the swiftest steam-transport belonging to the enemy, or to cut out and engage any of his fleet, and capture them if possible; but if not, to be able to escape, and to annoy a fleet with impunity.

The draught of such vessels must be light—not exceeding 9 feet, to enable them to seek shelter in our rivers where supplies of coal may be stored; and the ordnance powers must be the best in the world. In addition to high speed, the bow should be formed for colliding with an enemy with destructive force sufficient to sink him in a few minutes. The hull should be built to endure the battering of ordinary cannon shot, so that she might pass through a squadron in the night with safety. Other qualities will suggest themselves, and we venture to predict that a few vessels of war of this class, would harrass an enemy on our coast beyond endurance, should they ever be applied to such service. Their speed might vary from fifteen to eighteen knots; they would be required to carry but few stores, being calculated for coast service.

Second, Steam Propeller Frigates mounting from forty to sixty guns on two decks, to be propelled by sail and steam, and capable of great speed. We repudiate the so called "Auxiliary" system, believing that a mongrel propulsion is not fully adapted to the exigencies of navigation for a ship-of-war. If the sails are not sufficient to propel the ship without *aid* from the screw, how will she progress when the coal is all expended? and on the other hand, if the screw is inadequate to a full measure of propulsion without the aid of the sails, in what condition will the ship be in presence of a superior force, should a calm exist, or a chase to windward unhappily take place? We need not wait for experience to teach the fallacy of all "purely auxiliary" combinations of propelling power; they must be inferior resorts at best. To argue for a dull measure of performance in naval ships, is to confess incapacity for obtaining higher. We would make the propelling power *duplicate* instead of "auxiliary": then the model would be adapted to it, whether steam or canvass, or both should be employed. The speed of this class to be at least equal to the swiftest in the fleets of

other nations, and as much more as may be found practicable—say from 12 to 16 knots.

The smaller of this class should perhaps be most numerous, and somé of them specially calculated to carry provisions and coals to enable them to make long cruises in distant seas, to cut off the enemy's commerce, subsist at his expense, and capture the smaller vessels of his navy to be found abroad. They should be able to intercept his mail steamers and clipper ships, and resist successfully, or escape any force employed for their protection.

Third—Steam Propeller Sloops-of-war mounting from twelve to thirty-two heavy shell-guns on one deck, propelled by sail and steam as the frigates, but be far more numerous. The draft of water to vary from eleven or twelve to fourteen or sixteen feet, and speed to range between twelve and sixteen knots. The smaller of these vessels would cruise in company when seeking to destroy an enemy of superior force, their fleetness enabling them not merely to choose position, which is a small matter to commanding the attack itself, but to be master of all the advantages of manouvre throughout the battle, beginning and ending it at pleasure. A cruiser should never be compelled to engage under disadvantageous circumstances ; if self protection cannot be found in battery and gunnery, it should surely be evolved from a clear pair of heels—*velocity*. Nor should we omit the anticipation that vessels furnished with steam power, will most surely employ it for propulsion in time of engagements. The men will be required at the guns, and not at trimming sails; the evolutions of the ship will be speedier than in former sea-fights, and woe to the "auxiliary" fogy who cannot steam above 8 or 9 knots an hour.

A ship of twelve or fourteen knot speed will be able to bring her broad sides to bear three times while the slow sailer brings hers to bear twice; or, in other words, the fast ship will do as great execution in twenty minutes as the slow one in thirty; or she will successfully oppose a ship of the lower rate of speed which throws one-third more metal. But aside from the advantages of manouvre, it is well ascertained that the chances for receiving the enemy's broadside are considerably lessened by a nimble rate of speed; this is the case with batteries situated on shore, and how much more on sea, where they may sometimes be in motion in an opposite direction.

The employment of smaller armed vessels it is not worth while to discuss here. We will now glance at the steaming qualities of the best vessels of several classes in the English Navy, with a view to comparing our own with them, that we may appreciate the relative efficiency of the two Navies with regard to speed under steam alone, and the degree of improve-

ment necessary to place our own in a position corresponding with the present superiority of our ordnance powers.

The task is not a pleasing one; but its performance may not prove uninstructive nor barren of results. It is humbling to us to take a position astern of any nation in any art, but especially shipbuilding, in which our mechanics have given to the world so many proofs of superiority. We think a realizing sense of the truth will be all sufficient to work a reform. We begin with the largest ship in the English Navy.

Names.	*Guns.*	*Tonnage.*	*Length.* Ft.	*Breadth.* Ft.	*Engines.*	*Diameter.* Ins.	*Stroke.* Ins.	*Pressure.* lbs.	*Revolutions.*	*Screw.* Ft.	*Pitch.* Ft.	*Speed.* Knots.
Marlborough, (3 decks.)	131	4000	245½	61 1-6	2	82	48	20	52	19	26½	12
Victor Emanuel	91	3102	230	55½	2	76	42	—	55½	18 1-6	26	11.92
Pembroke (Razee)	60	1740	175	47 2-3	2	30	30	60		12	12	7.6
Shannon	51	2615	235	50	2	70	42	—	59	18	25	11.6
Swift Gun-boats	7	860	200	28 1-3	2	58	27	high		11	21½	13

It will be observed that the Pembroke represents a class of razeed seventy-fours that have been fitted for steam screw propulsion without lengthening or enlarging the hull. This description of vessel is pretty numerous in the English Navy in consequence of discarding exclusive sail propulsion and introducing steam as "auxiliary," to improve the speed and efficiency of the old line-of-battle ships. The speed is nevertheless close-hauled upon the rate attained by some of the full powered (so called) steamers of our own navy. See the table.

Names.	*Guns.*	*Tonnage.*	*Length.* Ft.	*Breadth.* Ft.	*Engines.*	*Diameter.* Ins.	*Stroke.* Ins.	*Pressure.* lbs.	*Revolutions.*	*Screw.* Ft.	*Pitch.* Ft.	*Speed.* Knots.
Niagara	12	4750	345	55	3			16	46	18¼	29	10 to 12
Merrimac class	60	3800	281	53 1-3	2	72	36		50	17 1-3	23	8 to 9¼
Princeton "	10	900	178	32½	2	57.6	36		25½	16		7 to 10
San Jacinto "	6	1446	215½	38	2	62.6	50	15	30	14 6		7 to 9
SIDE WHEEL STEAMERS.												
Mississippi "	10	1692	225	40	2	75	84	12	11	28		7 to 10
Susq'hanna "	9	2415	257	45	2	70	120	10	12	31.2		8 to 10¼
Powhatan	9	2415	254	45	2	70	120	11	12½	31		9½ to 11

The above table (excepting the Niagara and the Merrimac class) is copied from Lieut. Emmon's Statistical History of the Navy of the United

States; the speed given in the column, is intended to show the average and *maximum* performance. In a race with the United States frigate Susquehanna, and the British line-of-battle ship Agamemnon, the Niagara is said to have accomplished twelve knots—wind fair and moderate. On that occasion she proved rather more than a knot an hour swifter than the Susquehanna, and perhaps about 1½ knots faster than the British liner.—The speed of the Niagara and Merrimac class is under steam alone—that of the other vessels under sail *and* steam, and that of the British vessels in the first table is under steam alone at the measured mile.

We have no class of ships corresponding to the "Marlborough," and do not want any. The class represented by the "Victor Emanuel," is not above the power of our late steam frigates of the Merrimac type, with their superior shell armament and good gunnery in single combat; but difficulty would be presented in the inferior speed of the frigates, their very best performance under steam alone being reported at 9½ knots. On meeting the 91 gun British ship, a battle would be inevitable, and if unequal to the task of victory, escape would be impossible. What chance could the frigates have of avoiding battle where the odds of speed would be from 2½ to 4 knots against them, or what new "auxiliary" could they depend on to persue such an enemy, should he find it prudent to terminate the engagement by "firing" the boilers, instead of his shot or shell, and running up his steam pressure instead of hauling down his bunting? A deficiency of speed is a most effectual chaining up of the "dogs of war." The "Peace Societies" themselves could scarce ask more as an initial step on the part of our Government than such low pressure steaming and self-defensive fighting as at present our Navy seems adapted to, until England and France shall reduce their enormous navies to a corresponding footing.

The English frigates of the "Shannon" class would stand but little show for victory in a contest with our heavy frigates already mentioned; but it would be impossible to bring the "Shannon" or her consorts to battle, or compel the maintainance of it until a surrender, *unless the enemy chose.*—We have only one ship in the Navy that would probably prove equal to the task of compelling the Briton to stand his ground and fight the battle out—the Niagara, and she barely comes within the mark for speed, by reason of the mischievous policy of "auxiliary" engineering. We cannot conceive what idea of naval efficiency can exist in the mind of that man who contends, that if frigates of the Merrimac class "steam respectably eight or nine knots," "it will be quite sufficient speed to answer all the conditions required of this class."

If this be so, then England has made a great mistake in the endeavor to reach twelve knots in her ships of recent construction. Recently constructed French line-of-battle ships, and frigates are not a whit behind

those of England in point of speed, while the Russians have lately employed the English to *reproduce* the fleet destroyed in the late war, the velocity to be equal to that of the new ships of the Royal Navy.

The untoward policy of our influential Naval Engineers and constructors is not seconded by any nation in the world; the smallest of the powers that maintain a navy, look to England instead of the United States, as their naval shipbuilder. Russia, Sardinia, Chili, Peru, Brazil, Egypt, Turkey, Spain, and many other powers are now having orders filled for vessels-of-war in England, and we have no doubt every one of them will be able to steam above *ten* knots an hour—perhaps eleven or twelve. Although the world has given us credit for swift and efficient merchant ships, it fails to recognize our *naval* constructions as of that high character for fleetness which it is desirable to possess for warlike purposes; hence we have witnessed England herself coming to the United States for her "clipper-ships" and "Transports," but all the world becoming her customers for the battery ship. In conformity with this example, we now find Russia ordering her "*Transports*" from America; but the armed ships are to be built in England. One only, a seventy gun screw, is to be tried in New York, by way of experiment.

The late advertisement for a steam Sloop-of-War conceded something towards progress in the direction of speed—the call being for a velocity of "ten knots." This is better perhaps than eight or nine, deemed "quite sufficient" for the frigates; but still falling short of the rate adopted by our maritime rivals. Should this Sloop-of-War find herself on the track of an English or French Mail Steamer, she might persue the latter until her coals was exhausted, unless the wind was favorable, and altogether fail to intercept the prize. The only resource our Government would have for the command of vessels equal to such services, would be in our own swift-footed mail steamers, belonging to private citizens; but these would have to be fitted out and equipped and manned before they could be despatched, by which time the enemy's cruisers *of equal speed*, would have arrived on the track. Besides, our side-wheel steamers are not the best adapted for such services—for this we want especial cruisers of high speed. Nor should we forget that the merchant shipping of most nations have been much improved since the war of 1812. Hundreds of American models have been built from in all foreign countries. An eight or nine knot speed is not quite the thing for the chase of vessels such as will be likely to persue their occupation on the high seas in time of war—many of them fitted with auxiliary steam power.

England, France, Russia and Prussia however, are possessed of Steam Gun-boats adapted to such services. These vessels can serve as tenders to a few line-of-battle ships of inferior speed, stationed on our coast, and one-

placed on the track of sailing or steaming vessels engaged in mercantile persuits, their superior speed will enable them to cut out and capture shipping whenever opportunity offers; they could harrass our coast and commerce with impunity, until we were prepared for defence and reprisals, with suitable vessels of superior velocity. The mischief that could be done by an enemy with a flotilla of gun-boats, capable of thirteen to fourteen knot speed, and covered in their operations by a squadron of large ships, is very great. They could be directed to act in squadrons or be sent on special cruises; they could enter rivers and bombard towns with destructive effect; they could annihilate our coasters or drive them from the sea, and intercept all our mail steamers. They would probably be dispatched from the source of orders in sufficient numbers to invariably accomplish their work. Of this class of vessel England has a numerous fleet—so has France; they are now amongst the first ordered to China to operate upon the coasts and rivers of the Celestials, and we have reason to believe this class—the most popular war vessel in England to-day—will be largely increased.

In the event of war, one of the first measures of defence should be to drive the smaller ships of the enemy from our coast; for, it is by the employment of these, he would very probably seek to assail our liberties, since the heavy draft of water of his large vessels must necessarily confine operations with such ships to the blockade and bombardment of the large seaports.

Steam Sloops-of-war of light draft, and gun-boats of liberal magnitude and earnest speed, seem best adapted to this service. But they must be able to avoid falling into the range of a superior force. We trust the day is yet distant when we shall be called upon to again defend our liberties and rights; but in the light of history we read, that the foot-prints of blood have ever and anon stained the soil of every nation that has ever existed; how then can we afford to trifle with the energies which nature and the genius of our people have stored up in undeveloped resources for defensive and aggressive war? Why trifle with the sailing and steaming qualities of the Navy—the right arm of power—but present to the world the discrepant spectacle of the most powerful and efficient battery mounted on the decks of slow ships. Let the present Administration set the matter right, as the greatest work it can do for the perpetuation of national independence.

SUCCESS IN ART DEPENDENT ON FIRST PRINCIPLES.

It is no less true to day than it ever has been, that in the physical world there are two great wants felt by man. The first, and the one most imperious, is that of fixed immutable principles, which depend upon neither time, place or circumstance, on which the mind of the student may repose with unbounded confidence. The second great need is, that we be not the dupes of chimerical notions, of ingenuous postulations, of incongruous combinations, or of artificial barren abstractions;—the need of vitality, life, and experience.

Those of the physical sciences whose regular developments and rapid conquests astonish, dazzle, awe and bewilder the ignorant, owe their progress to that which we may denominate the experimental method. To unite observation to reason by the path of experience, is one of the great problems in the philosophy of nautical science, not less than in every other. It is not more certain that intelligence controls the order of the universe, than that logic is the mathematics of thought, and must preside over the reasoning faculties of man; without this predominating influence there is no such thing as hypothesis in philosophy, demonstration in science, or utility in art. If axioms, like inventions, were patentable, the world would have been better able to appreciate their importance at this epoch of its history.

Truth ever adapts itself to the forms of human thought, and here is the rock upon which thousands have been wrecked. As new truths are discovered the old ones are not to be rejected, but to be remodelled and incorporated with newly discovered truths; and while the principle remains unchanged, one truth, by being remodelled, becomes identified with other truths, and a more full development of the laws of physical life is thus attained. We sometimes call men *fogyistic*, not because they are weighed down with years, not because of the infirmities of age, but because their minds remain stationary, while the world around them is advancing;—some of the most inveterate of this class have not yet reached the age of twenty-five. There is nowhere within the orbit of physical science to be found so many antiquated notions as are incorporated in the science of nautical construction and navigation; these are cherished with as much tenacity as if life itself depended on their security. We have long maintained that navigators should be well informed on the elements of nautical construction. By this we do not mean that they should only know how many bolts of a given size and length are equal to the strength of a given number of cubic feet of timber, of a given density and amount of cohesive strength; but we mean that they should know the principles of adap-

tation and distribution of the bulk and strength of a vessel, to the service for which she is intended. Now what are the facts in reference to the knowledge of navigators—and may we not place some shipbuilders in the same category? Alas! it is too true, if we may judge from their labors, that not a small portion of the shipbuilding fraternity are far, very far from being men of science. We have more than once cast our eye over the map of this great continent for the purpose of singling out the maritime districts, and measuring the capacity of the builders by the ships which have been built—and who can object to this standard of measurement? Is it not as truthful to day as when the Divine mandate was first given in Palestine that "a tree may be known by its fruit?" and may not a man's capacities in science or art be determined by the work of his hands? This, we think, is logical reasoning, and such as we shall not be required to demonstrate, it being self-evident to the most obtuse minds.

It is a well-established axiom which shipbuilders, as well as merchants and ship masters, would do well to remember, that when freights are low, only such vessels are employed as represent the *smallest investment* (*pro-rata*) *consequent upon the best proportionate principal dimensions, for large cargo and quick returns.* The novitiate in commercial transactions can well understand, that if such vessels are profitable when freights are low, they cannot be otherwise when prices run high; and such vessels being the first to be employed, it is equally certain that they are the last to be found idle for want of employment. Our ship-owners are, as a class, business men in every sense of the term—not easily deceived by others, but alas! too often deceived by themselves. However mortifying to be over-reached by another, it is, we think, not the less so to over-reach ourselves in our ambition to be the architect of the fabric we may have the financial ability to own. It is only by recurring to first principles in any art or science that we are able to determine our progress.

But to return to the question. What amount of knowledge of the first principles of maritime construction may be set down as the standard of attainment by our ship-owners, masters and builders? The service or trade for which the vessel is designed, with the tonnage and rig, and subsequent to her first voyage, the capacity for a certain kind of cargo, is about all the practical knowledge of which the ship-owner can boast, notwithstanding, in some instances, he claims to have furnished the builder with all the elements of success which his vessel may possess. Whatever else the ship-owner may know of vessels than what has been shown, he finds in his ledger. It is impossible in the nature of things that he should know more, being neither by practice or profession an architect, mechanic, or mariner. Had nature endowed the shipowner with gifts in the designing or constructive art, his proclivities could scarcely have been kept in

obscurity, with the two-fold advantage of finding a market for the development of the rare talent he possessed. We do not object to ship-owners becoming constructive students—indeed, we would be highly pleased to find them thus employing their leisure moments; it would be greatly to their own and to the world's advantage; but we do object to their doing so large a business in the line of dictation upon so small a capital in scientific knowledge as ship-owners in general possess. The safety of human life forbids it; the interests of humanity forbid it; and their own financial interests, when well considered, demurs in unmistakable tones at the absurdity. The bills of wear and tear, and frequent disasters to the vessels, points significantly to the incongruity.

The ship master's standard of constructive knowledge may not be so readily defined as that of the owner. His sphere of knowledge may not be wholly confined within the orbit of navigation and seamanship, but it is not architectural, nor is it mechanical, consequently it cannot be constructive. In counselling with the owner he obtains that which, to him, serves the purpose of first principles, viz: *tonnage and principal dimensions*, and becomes the one idea, both with owner and master, without a line having been drawn, or a formula expressed to determine the qualities in *stability*, *capacity*, *ease of motion*, *draught of water*, or *resistance* of the vessel to be built. But alas for the safety of the ocean traveller, and the prevailing ignorance of first principles, in order to be truthful we are compelled to place by far the greatest portion of the shipbuilders of the United States in the same category, the diagnostics being unmistakable to an ordinary mind, that is versed in the philosophy of nautical construction. The draft and calculations of a vessel furnish the only chart from which to determine her size or qualities with reference to utility or safety as a carrier of passengers or merchandise, and yet hundreds of vessels are built without draft or problematic solution touching the characteristics of the vessel to be built, which, as a consequence, become too often a winding-sheet for hundreds of confiding travellers. We insist upon it that no vessel is, for navigable purposes, worthy of the name as such, which is made like shoes upon the last, having only a block of wood, called a model, for the pattern. Not only the capacity, stability and resistance, but the relative strength of the vessel must be drawn from the draft, and it is because there is no draft and calculations for nine tenths of the vessels built in the United States, from which to determine these qualities, that there is such a fearful list of disasters, and such heart scenes in flotative transit, not only upon the broad Atlantic, but upon all parts of the American coast. The ship owner regards the cheapest ship as the best ship, and, as a consequence, the builder regards that quantity and quality of material, as well as workmanship, the best which is the cheapest. We would

gladly say that the foregoing was too highly colored, but truth bids us forbear to endorse the laxity of morals so fearfully developed in nautical construction *by those who have made fortunes out of cheap ships.*

The necessity of developing first principles by having mechanics to make out the specifications and to superintend the construction of vessels, is becoming still more apparent than it ever has been. The fragile fabrics which navigate our coast are never known until the most dire calamity overtakes them, and then the deformity of shape is made apparent, from which, in connection with the fearful extent of the *spinal disease*, she founders, and all is lost.

In some parts of Europe a shipbuilder is not allowed to practise in the line of his profession without a license, and that license cannot be obtained without submittng to and passing a thorough examination in the first principles of nautical construction, when he receives a diploma. The model of a vessel is to the student in constructive science, what the globe is to the student in Geography—a scholastic illustration, and is only adapted to the instruction of the novitiate, who does not understand planes of projection. And the man who gives configuration to his vessel from the model alone, confesses to the world his incapacity for scientific demonstration, and should undergo an examination before being allowed to tamper with the safety of human life by constructing fabrics, the strength, stability, and safety of which he has no means of determining, to be like a cockle-shell at the mercy of elements governed by laws, with which laws his vessel must either harmonize or conflict, and the chances are a thousand to one that she will conflict with them. We require our physicians to procure testimonials of knowledge in first principles; are our shipbuilders and masters less responsible? Is it of less importance that there should be an institute for the study of nautical architecture than for medicine? We think not.

Naval Item.—The extent of the injuries to the United States steam frigate Roanoke, now undergoing repairs at the Navy-Yard, Charlestown, Mass., is thought to be of a more serious nature than at first apprehended. It will be recollected that she sustained very serious injuries while being launched from the stocks at the Norfolk, Va., Navy Yard; the damages that were done her at the time, the constructors have never been wholly able to repair. It has been suggested by a board of survey that all her machinery be taken out, and a rigid examination instituted throughout every part of her. This will cause a delay of at least three months, before she will again be ready for sea.

SCIENCE IN MUSKETRY.

In musketry not less than in ordnance, is the study of the passage of projectiles through the air needful. Indeed it is the especial business of a portion of those who make up the sum total of combatants on vessels of war, to be well versed in Musketry. For the benefit of those whose patriotism is sometimes exhibited by the use of this instrument of death, the following leading initiatory points, which should be much more generally understood than they are, with definitions pertaining to the Gun and the course of the bullet, may be found useful, upon the component parts of bodies, their specific gravity, their weight, the *Vis Inertia* of matter, the composition and elements of forces, the velocity and momentum of bodies, the Resultant of forces, the center of gravity, and fall of bodies, Atmospheric resistance, the density, size and form of bodies ; velocity and the parabolic curve.

I.

A body is composed of numerous particles, which are separated by pores ; the less porous a body is, or the greater the number of particles contained in a certain space, the greater is its density.

The density or specific gravity of a body is the proportion that its weight bears to an equal volume of water at a temperature of 39° 2′ F.

The weight of a body is its cubical contents multiplied by its specific gravity.

The nature of matter is such that of itself it will not change its form or position ; a body at rest would remain so—one in motion would continue to move in a straight line. This property is termed the *vis inertia* of matter, and the power which overcomes this tendency, is a force.

Forces producing motion, may be divided into two classes : instantaneous forces, which act during an imperceptible period and produce uniform movement; and permanent forces, which act constantly either to increase or retard motion.

The elements of a force are the point of its application, the direction in which it urges that point, and its power.

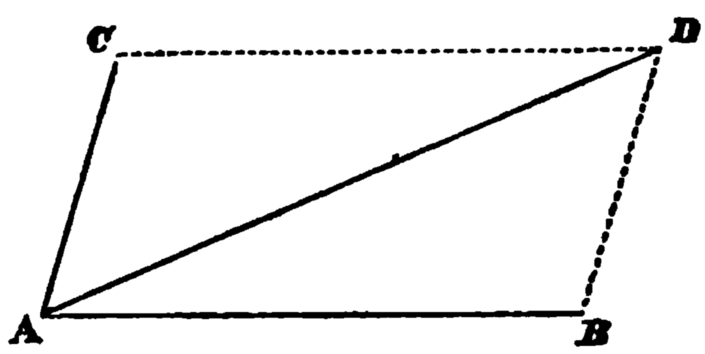
The velocity of a body endowed with uniform motion, is found by dividing the space it has passed through in a certain period by the time that it took to traverse the space. Thus the velocity of a body travelling 100 feet in 4 seconds, is 25 feet per second.

The velocity of a body moving with a regular increasing speed, is directly in proportion to the time of movement. So the velocity of a body when it had been one second in motion, and the time of its movement,

being known, their product will give the velocity acquired at the expiration of the given time.

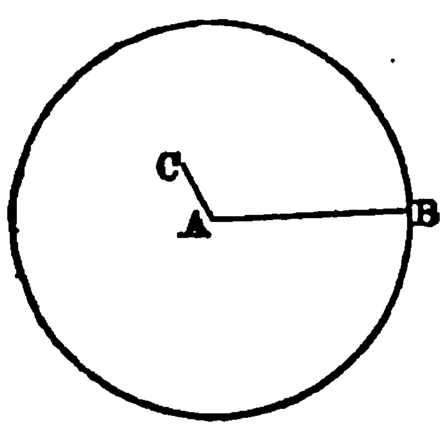
The momentum or power of a moving body, is the product of its weight and velocity.

A body under the influence of two or more forces, will move in the resultant of the forces; or, if the forces counterbalance one another, it will remain motionless. If two unequal forces are directly opposed to each other, the resultant will be in the direction of the most powerful.



The resultant of two forces not directly opposed to one another, will be expressed by the diagonal of the parallelogram described upon the lines denoting the powers and directions of the forces. Thus A D denotes the power and direction of the resultant of the two forces, acting at the point A, represented by the lines A B and A C.

There is a point in every body through which passes the resultant of the forces of gravity that act upon each of its particles; this point is the centre of gravity. If suspended or rested at this point, the body will remain in equilibrium. The centre of gravity in a sphere is in a point equally distant from any portion of its surface. The centre of gravity of a cylinder is in the centre of its axis, and of a cone at a point in the axis one-fourth of the height from its base.



All bodies have a tendency to carry their centres of gravity, or heaviest end, foremost; this is equally the case with bullets. Let us take a spherical bullet, having the centre of gravity at C, at the distance C A from the centre of the figure. Suppose this bullet discharged from the barrel in the position shown in the diagram, and in a direction from A through B, the resultant of the force of the resistance of the atmosphere to the bullet's movement will be in the line B A, and will act at the point A on A C as a lever to force C forward, until A C falls into the line of direction. If the centre of gravity C lies, at the time of discharge, directly behind A, the resultant of the forces of gravity passing through C will draw it downwards, and then the atmospheric resistance will act, as already explained, to bring to the front that portion of the surface of the bullet nearest to the centre of gravity.

The rotation of the bullet to change the position of the centre of gravity produces a change in the bullet's course. If at the discharge, the centre of gravity lies above the centre of the figure, the rotation will cause the bullet to rise, and give an increase of range; for it is apparent that the re-

sistance of the atmosphere to the rotary motion will press the surface in a direction opposite to that of its revolution; in the case of the centre of gravity being above the centre of the figure, the posterior surface will move upwards and the anterior surface of the bullet downwards; if the pressure of the air were the same before and behind, no change of course would ensue; but the great pressure being in front, the bullet rises, that is in a direction contrary to the revolution of the surface in front. So also will the discharge of the bullet with the centre of gravity below, or on one side of the centre of the figure, cause loss of range, or lateral deviation. The notice of these deviations is more curious than useful in considering so small projectiles as those used with muskets.

The moment a body is freed from support, it is drawn downwards by the power of gravity, and it has been found that it will pass through a space of 16 feet in the first second, when it will have acquired a velocity of 32 feet; and the spaces traversed by the descending body, are to one another as the squares of the times of descent; also the velocities are to each other as the times. Thus the descents and velocities at the expiration of each second, are as follows:

Times	1	2	3	4	5	Seconds
Descents	16	64	144	256	400	Feet
Velocities	32	64	96	128	160	"

We will now consider the resistance of the air to the motion of a projectile. The atmospheric resistance is the result of the reaction of the force with which the projectile encounters the particles of air that it constantly meets in its course.

The degree of resistance experienced by a projectile, will depend principally upon its density, its size, its form, and its velocity. Let us consider each of these points separately.

In the atmosphere, the bullet will not describe such a curve. The constant action of the atmospheric resistance will gradually lessen the velocity until, towards the end of its flight, the bullet will move with much less velocity than at leaving the barrel; consequently the loss of ascent or fall due to gravity, will be greater in proportion to distances traversed than it would be in vacuum, and the curve will be much greater towards the close of the flight, so that the bullet will fall the height that it has ascended while passing over a distance probably about half the distance that it passed over in its ascent. Let A N M represent the course of the bullet through the air, and N the highest point.

With an elevation of 45 degrees, a gun would throw furthest in vacuum. This is not the case in practice; some descriptions of cannon obtain their

greatest range with an elevation of 42 degrees, and the rifle-musket at about 24 degrees elevation.

The greater the density of a body, the more numerous are the particles that it contains to oppose to the atmospheric resistance; doubling the weight of a bullet, without any change in size or form, doubles its power of overcoming resistance; and it will then only experience half the loss of velocity due for the resistance of the air before increasing the density. The losses of velocity are to one another, therefore, in an inverse proportion of the densities.

Take two bodies equal in weight and similar in form, one of which exposes twice as much surface as the other to the atmospheric resistance; it will encounter double the number of atmospheric particles that the lesser body does. We may, therefore, calculate the resistance to be in proportion to the extent of the surfaces on which the atmosphere acts; this is, however, not precisely true, as the air cannot escape quickly from before the greater body, and, therefore, each of a greater number of atmospheric atoms will act for a longer period on the more extended surface than the fewer particles on the smaller space.

The adaptability of the form of the bullet to passing through the air, chiefly depends upon the shape of the anterior portion; if it exposes a surface flat and perpendicular to the line of direction, the particles of air that it encounters, will act directly against it with their whole force. Such would be the resistance experienced by the base of a cylinder moving in the line of the axis of a cylinder.

If the anterior surface of the figure is inclined to the line of direction, as in a cone moving point foremost, the atmospheric resistance acts obliquely, and expends some of its force in counterbalancing the pressure of the air, which is equal on opposite points; therefore only a portion of the atmospheric resistance is opposed to the movement of a bullet with a conical anterior termination.

Though the conical shape is better adapted to penetrate, it is inferior to a cylindrical form of a bullet, as, with equal heights and bases, the cone has only one-third of the weight of the cylinder, and therefore only one-third of the power of overcoming the atmospheric resistance. In another respect the one will appear inferior, on considering that a bullet separates particles of air that are not able to close immediately, it may pass them; consequently a vacuum, more or less perfect, is formed behind the bullet. Now, this vacuum leaves the posterior surface unsupported by atmospheric pressure, which would assist in nullifying the resistance in front. [illegible] the base of the conical being similar and equal to that of the cylind[illegible] bullet, the same vacuum will be produced by either shape, while on-

scription has so much greater power of overcoming atmospheric resistance.

These considerations suggest a combination of the two figures to produce the best form for a bullet—a cylinder with a conical termination to cut through the air.

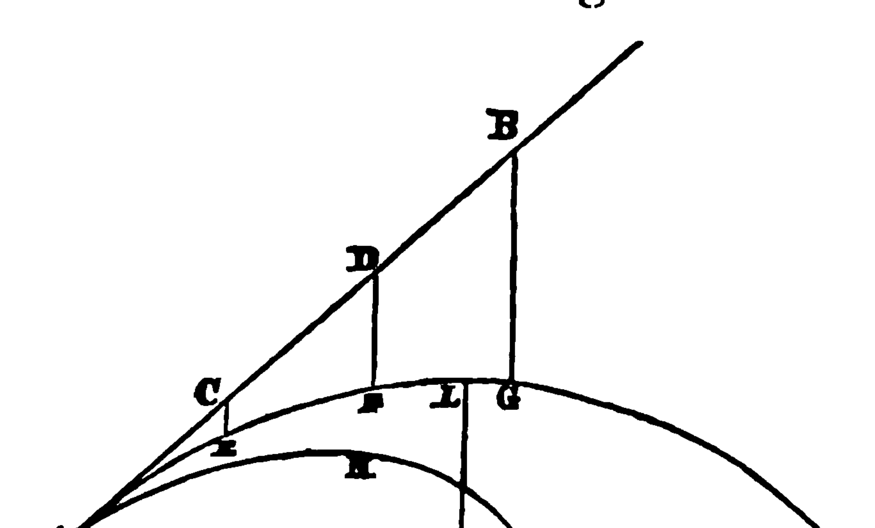
A sphere posesses one advantage over all other shapes; whatever change takes place in its movement, it invariably exposes a similar and equal surface to the resistance of the air.

We have said that the resistance of the air to the movement of a bullet, is the result of the reaction of the force with which it strikes the atmospheric atoms. If we double the velocity of the bullet, the force with which it meets the air is doubled. We may, then, for this cause, say, that doubling the velocity, doubles the atmospheric resistance; and, considering that with doubled velocity the bullet will meet twice the quantity of air in the same period of time, we may calculate the resistance as again doubled, for this reason. Thus a fourfold atmospheric resistance results from doubling the velocity of a bullet. In a similar manner we might show that increasing the velocity three times, produces nine times as great resistance. The atmospheric resistance is, then, as the squares of the velocities.

Heat and moisture will cause changes in the density of the atmosphere that scarcely require notice for such small projectiles as bullets; it is sufficient to observe that a rise in the thermometer and a fall in the barometer indicate a rarefaction of the atmosphere, that will decrease its power of resistance.

Now let us proceed to consider the course of a bullet. As soon as it leaves the barrel, it is under the influence of three forces—the impetus bestowed upon it by the explosion of the powder, gravity, and atmospheric resistance.

Remove the power of gravity and the atmospheric resistance, and the bullet, under the influence of an instantaneous force, will move forward at a uniform rate in a straight line.



Let A B represent the direction, and A C, C D, D B equal distances through which the bullet would pass in the first, second, and third seconds after leaving the barrel.

Next let us imagine the musket discharged in vacuum. The bullet, driven in the direction A B, will, under the influence of gravity, lose 16 feet of ascent for the first second, 64 feet at the end of the next second,

144 at the end of the third second. From C, D, and B let fall perpendicular; C E equal to 16 feet, D F to 64 feet, and B G to 144 feet. E, F, and G are the positions of the bullet at the expiration of the first, second and third seconds of its flight in vacuum. Ascertaining more points would show that the bullet follows a curved line—A E F G H.

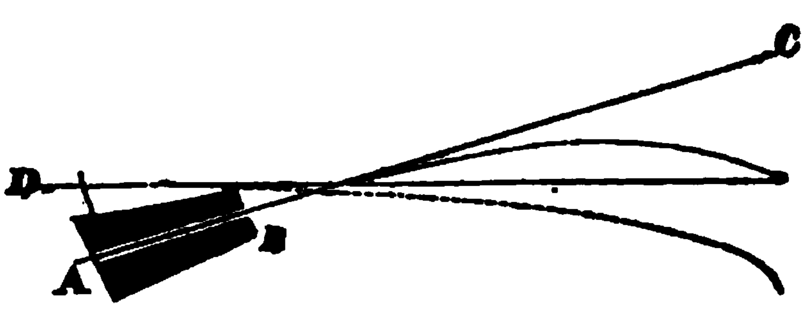
The Parabolic Curve has its greatest elevation in the centre of the curve, at the point L. The curve is the same on both sides of L, that is, the angles of ascent and descent are equal.

II.

We now proceed to notice some definitions pertaining to the gun and the course of the bullet.

The Barrel.—The interior of the barrel, or bore, of the musket is cylindrical, and of the same dimensions throughout; it is not so with the exterior, which is much larger at the breech, where the powder explodes: here the metal requires sufficient thickness to resist the expansive force of the powder, which acts equally in every direction; in proportion to the distance from the breech, the force of the powder decreases; so may the solidity of the metal—it gradually diminishes until the least exterior diameter is attained at the muzzle. This construction decreases the weight of the musket and makes it balance easily in the hand.

The Axis.—An imaginary line, represented in the diagram by the line A B, is termed the axis of the barrel; it is supposed to pass through the centre of the bore, and is the course followed by the centre of the bullet while passing through the barrel.



The Line of Fire.—The line of fire, or line of projection, is the prolongation of the axis beyond the muzzle; it is represented by the line B C in the diagram; it is the line that the bullet would take if freed from the action of gravity and atmospheric resistance.

The Line of Sight.—The line of sight, or line of vision, is supposed to pass from the eye, through the centre of the notch of the back-sight, over the top of the fore-sight, and terminate in the object at which aim is taken. This line crosses the line of fire once. The position of the eye is shown at D in the diagram, and the line of sight is the straight line from D passing through the centre of the mark.

The Trajectory.—The curved line supposed to be described by the bullet in its flight is termed the trajectory; it is below the line of fire, and twice crosses the line of sight—once near the muzzle, and again at the mark.

The Plane of Fire.—The plane of fire contains the line of fire and the line of sight. The trajectory should also be in this plane.

The Angle of Fire.—The angle of fire is the angle contained between the line of fire and the plane of the horizon.

The Angle of Sight.—The angle formed by the intersection of the line of sight and the line of fire is termed the angle of sight. It is equal to the angle of elevation given to the piece above the object at which it is aimed.

The Point-blank Range.—The point-blank range of a gun is the distance that it will throw, when fired, without any elevation, and at the height above the ground that it is intended to be generally used. Four feet six inches is about the average height above the ground that soldiers, standing, hold the barrel of their muskets in the firing position. The point-blank range of a musket is, then, found by laying its axis in a horizontal plane, four feet six inches above the ground, and measuring the distance from the muzzle to the spot at which the bullet strikes on level ground when the gun is discharged in this position.

La Portee de But en Blanc.—It is necessary in French works to be aware that "la portee de but en blanc" differs from the point-blank range; the former is the distance measured from the muzzle to the second intersection of the trajectory and the line of sight, when the aim is through the sight of least elevation.

The Initial Velocity.—The rate at which a bullet moves immediately it quits the barrel, is termed the initial velocity.

The Principle of Sighting.—The principle upon which guns are sighted is, that the axis should be directed as much above the mark as the bullet would strike below the mark at the distance for which the sight is intended if no elevation was given to the musket. In the diagram, we observe that the aim is taken by the sights at the bull's-eye which the bullet is shown to strike, while the line of fire passes over the target; the distance that the line of fire passes over the centre of the bull's-eye is equal to the distance that the bullet would have struck below the mark if the gun had been fired at the same range without any elevation; that is, with the axis and line of fire in the line now representing the line of sight. A dotted line represents the trajectory that would have been obtained without elevation. The greater the range, the more elevation is required to be given to the muzzle; and rifles have movable back sights, which are raised higher as the distance increases, so that the muzzle has to be raised to bring the fore-sight in a line with the back-sight and the mark.

To obtain a Trajectory.—We may determine the trajectory of a musket

by firing shots from as many intermediate distances as may appear necessary. Each shot must be fired with the line of sight in the plane of the horizon, and with the sight set for the distance of which the trajectory is required, and the height above the mark that the bullet strikes the target at each distance must be noted; then, reducing the scale on paper, we can describe the trajectory by measuring along the line of sight the whole range and intermediate distances of which shots are fired; over each distance mark the altitude of the shot noted for that distance. The different points of the trajectory that are thus fixed, may be connected by a curved line to denote the course of the bullet.

Another method is by fixing screens of cloth at intermediate distances along the range, and firing from the extremity of the range with a horizontal line of sight, and then measuring the height of each shot above the line of sight; if requisite, use the positions thus found to place the trajectory on paper as before. Either of these methods will only serve distances for which a target or screen of the necessary height can be obtained; and the use of the screens produces much inaccuracy, as the resistance experienced by the bullet in penetrating each screen must considerably reduce its flight.

We have considered the course of the trajectory to be determined by a single shot from each distance, but no satisfactory determination of the position of a point in a trajectory, or of the firing power of a weapon, could be obtained without firing several shots, and then taking the average effect of the whole number of shots fired. We will now proceed to consider the method of calculating this average value.

Vertical Deviations.—To obtain the average of the distances that any number of shots strike the target above or below the level of the mark, draw a horizontal line passing through the centre of the bull's-eye; measure the distance at which each bullet strikes above or below the line, and note these measurements in two columns—one column for those over, and the other for those under the mark; total these two columns, and the mean vertical deviation is on the side of the line which has the largest total. Subtract the less total from the greater, and the division of the remainder by the number of shots fired, will show the distance of the mean vertical deviation above or below the point of aim, [illegible] as the greater total indicated the mean deviation to be over or [illegible] rk.

Let us take ten shots of which it is [illegible] mean vertical deviation, and having measured their [illegible] elow [illegible] horizontal line, note them in two columns [illegible]

Vertical Deviations.

UPPER.		LOWER.	
Hits.	Inches.	Hits.	Inches.
1	28	3	18
2	14	4	23
9	20	5	16
10	16	6	28
		7	25
		8	18
Total	78	Total	128

Here we find that the average effect of the shots is below the line; and the difference, fifty inches, divided by ten, the number of shots, gives five inches as the mean vertical deviation below the mark.

Horizontal Deviations.—For ascertaining a trajectory, only vertical deviations are required; to test the accuracy of firing, the mean horizontal deviation is also requisite. Divide the target by a perpendicular line passing through the centre of the mark. The lateral deviations are measured from this line, and noted in two columns according as they occur to the right or left of the line, and the calculation is similar to that for finding the mean vertical deviation.

The right of the target is that portion to the right of the person firing. Let us suppose the lateral deviations of the shots already fired to be as follows:

Horizontal Deviations.

LEFT.		RIGHT.	
Hits.	Inches.	Hits.	Inches.
1	15	4	14
2	14	6	25
3	8	8	18
5	13	9	24
7	11	10	20
Total	61	Total	101

These totals denote the mean deviation to be to the right of the mark, and if we divide their difference, 40 inches, by the number of shots, 10, we find that the mean horizontal deviation to the right of the point of aim is four inches.

Point of Mean Impact.—With these two deviations we can find on the target a spot representing the average relative position that ten hits have

to the centre; this spot is termed the point of mean impact; its distance from the centre is the merit of the marksman. To find the point of mean impact for the above ten shots, measure along the perpendicular line the five inches mean vertical deviation above the centre of the mark, and on the horizontal line the four inches mean horizontal deviation to the right of the centre; at these points, four and five inches from the centre, raise perpendiculars to the lines on which the distances are measured; the intersection of these perpendiculars will be the point of mean impact. The distance of the point of mean impact from the centre may be obtained by actual measurement, or else, as the distance is a line subtending a right-angled triangle of which the sides containing the right angle are 4 and 5 inches in length, we have only to square these numbers, add the squares, 16 and 25, and the square root of their sum, 41, will be about 6.40 inches, the distance of the point of mean impact from the centre.

The distance of the point of mean impact from the centre gives the merit of the shooting, not always that of the weapon, which may have been incorrectly sighted, and therefore, in the trial of a weapon, it is usual, after finding the point of mean impact of the shots fired from it, to calculate the average distance of the whole of the hits from their point of mean impact.

A String.—Perhaps the simplest plan for deciding in shooting matches, is by the American method of "a string." In a fixed number of rounds, the total of the distances from the centre of the bull's-eye of the hits of each person, is a string; and, of course, the best shooting produces the shortest string.

THE BRAZILIAN NAVY.—We mentioned some time since the adoption by the Naval School of Brazil, at Rio, of the plan of our Government, to give pupils of the same some practical idea of their profession before entering upon it. On this service the corvette "Imperial Marine" recently arrived at Palermo, Sicily, with the whole of the second class on board. It was thence to visit Naples, whence it would pay a visit to all the French and English ports. Brazil has many of the elements of a first rate naval power, and this shows a laudable ambition to improve them.

THE COLLINS STEAMSHIP ADRIATIC.

Now that this ship has been completed we will furnish some account of her construction, and also that of her great English rival—the Persia. In their legitimate efforts for the supremacy, the Cunard and Collins Companies have each produced a specimen of marine architecture far in advance of their previous productions, not only in magnitude but in interior finish. The delay in getting the machinery of the Adriatic completed has been unexampled for duration in the history of steamship enterprise in this country, and we fear has not operated very much to our national credit abroad. The reason why she was not brought out at the proper time was the adoption, by the designers, of an untried valve and of an untried condenser, both of which proved unfit for the uses intended. But a great deal of time was fruitlessly expended in the endeavor to make the objectionable inventions work.

The valve which American mechanics knew how to build, and which American engineers prefer to any, and have adopted for all our ferry-boats, steamboats and steamships, is the balance and puppet valve. During the last few years the advantage of a variable cut-off has been generally recognised, and Sickle's cut-off has been adopted as the best and placed on numerous land and marine engines. The valve adopted for the Adriatic was one patented in the United States June 19, 1855, and in England Oct. 19, 1855, by Horatio Allen. It is somewhat like a faucet, with a plug four feet long and thirty inches in diameter, with a very small taper. This plug is made light by reducing it to the parts necessary for closing and opening the steam passages in the conical envelope. It has two motions—one of translation in the direction of its axis to unwedge it, and another of rotation to open or close the passages. A cut-off, such as might be used with a sliding valve, completes the plan. This arrangement had answered for small machines, but was of such a nature as to leave it doubtful whether or not it would do for large ones. Having failed it was taken off, and Mr Sickles was employed to put on his adjustable link motion cut off; and after a trial in which it did not operate satisfactorily, Mr Allen was allowed to resume the work in conformity with his own plans.

The construction of a surface condenser, to avoid loss of heat by blowing off, and destruction of boilers by deposits, was unsuccessfully attempted by Watt before 1800. Hundreds of patents have been taken out under this title, but all have proved impracticable. The general defect was that in all of them the parts were alternately heated and cooled, at the same time that a vacuum existed inside and that atmospheric pressure was acting on the outside. The joints could not stand this and would leak. In 1850, Mr. Pirsson patented a surface condenser in which a vacuum is

produced outside as well as inside, thus avoiding the most active cause of leakage, and making it harmless if produced by other causes. Another advantage of this invention is that it includes all the parts of the ordinary jet condenser, so that if it gets out of order, the old plan of direct condensation is substituted by simply turning a cock. This arrangement is now employed on about thirty of our best ocean steamers. The condenser adopted for the Adriatic was one with atmospheric pressure on one side and vacuum on the other. One pipe after another began to leak, one joint after another was repaired, till the work was abandoned. The ship has finally been freed of this concern, and Pirsson's condenser is now being put in.

The Adriatic was built by George & James R. Steers—the machinery by the Novelty Works. The frame of the hull is of white oak, live oak, and red cedar. Timbering room, 40 inches; floors sided, 14 inches; futtocks, 12 inches; top timbers, 11 inches; floors moulded, 22 inches at the seat. The bottom between frames is filled in solid with white oak, except forward and aft, where the filling is white pine. While the frames were being raised, and before the planking was put on, the entire frame was saturated with strong pickle every day and the ship was afterwards salted. The frame was strapped with diagonal and double-laid iron braces 5 x 7-8 inches, secured as usual. The main keelson and two floor keelsons on each side of it are sided 12, and moulded 26 inches, built of logs. The ceiling between them is of pitch-pine logs, 12 inches square. The planking inside and out is of yellow pine, also the deck frames; the knees throughout the ship are hackmatack. The garboards are 12 and 11 inches thick respectively, and the plank of the bottom are of great thickness, from 11 inches at the second garboard strake, diminishing to 9 inches at the second futtock head, and so on up to 6 inches at the locality of top height. The hold is divided into compartments by seven bulkheads of yellow-pine plank, matched and fitted in two thicknesses of 1 3-4 inches, and crossing each other diagonally at an angle of 45° from a vertical line. These bulkheads are felted between thicknesses, and extend from the ceiling at the floor to the beams of main deck. The half way security thus provided for passengers is perhaps better than none at all, and it adds greatly to the strength of the ship; but one can see no greater necessity of providing against accidents of flood than fire, occurring as they do in about equal numbers. In case of a fire raging with any considerable degree of fury, as it must do in the interior of such a ship, the slender and inflamable bulkheads of yellow pine would scarcely compel the flames to pause in their spread from one end of the vessel to the other. Now, why not make these bulkheads of *plate iron*, as we have so often pointed out should be done, in order to gain a tolerable degree of security from the spread of flames as well as the

rush of waters, imperiling the lives of passengers and crew? Nor should it be forgotten that a ship provided with bulkheads should have extra kelson strength. This the Adriatic has not got. Her bottom is a raft of logs, it is true, and it is also true that these logs have *butts*, stiff and unyielding, and therefore not so easily secured in place as thinner stuff. We had the temerity to propose to Mr. Collins the adoption of plate iron kelsons, which would have given the bottom of the ship the utmost rigidity and strength in the smallest possible space, with the minimum weight of material, and at no greater expense than has been laid out for pine logs and fastening. We were referred to Capt. Luce, of *Arctic* memory, the superintendent of the ship, from whom we soon learned that "a *scarphed* timber was as strong as a whole one," and "wood much stronger than iron for kelsons!" With such men for superintending *architects*, the perfection of shipbuilding is a long way off.

DIMENSIONS OF HULL AND ENGINES.

	Ft.	In.
Length on the keel . .	330	
" " Load Water Line .	343	8
" " Deck over all . .	354	
Breadth moulded, ...	48	6
" extreme, ...	50	
Depth to spar deck	32	10

Tonnage, (carpenter's measurement), 5,888 tons.

Kind of engines, oscillating; boilers, vertical tubular variety; two cylinders, diameter 100 inches; length of stroke, 12 feet; diameter of paddle-wheels over boards, 40 feet; length of boards, 12 feet; depth of do., 3 ft.; number of do., 32; number of boilers, 8; area of immersed section at load draught, 740, even trim, draft of water, 20 ft.; independent steam, fire, and bilge pumps, 2.

The oscillating engines are placed over the keel, one before, the other abaft the shaft. The cylinders are inclined toward each other, making an angle of 45° with the horizon. The shaft is of two pieces; on the ends near the centre of the ship are two cranks, and each piston rod is attached to the crank pin of one of the cranks. The use of two crank pins leaves both shafts free to play; but to make them work together the crank pins are made longer than the usual proportion, and their ends are united by a drag-link. One of the cranks is thus in advance of the other at an angle of about 18°, and the drag-link being exactly over the keel, one cylinder is about one foot on the starboard, and the other one foot on the larboard side. This kind of machinery does away with walking beams or

side levers, connecting rods, parallel motions, &c.; it is more simple than any other, and many engineers of standing consider it the best.

The Adriatic will probably consume 120 tons of coal in 24 hours, evaporating 7 pounds of water for every pound of coal burned. The pressure of steam will be 25 pounds to the inch. She will make 15 revolutions per minute. Thus, in one hour, she will consume 11,200 pounds of coal, by which 78,400 pounds of water will be converted into 796,160 cubic feet of steam. Cutting off after the piston has moved 4 feet, the pressure will be, at the end of the first foot, 25 pounds; of the second foot, 25 pounds; of the third, 25 pounds; of the fourth, 25 pounds; of the fifth, 20 pounds; of the sixth, 16.66 pounds; of the seventh, 14.28 pounds; of the eighth, 12.50 pounds; of the ninth, 11.08 pounds; of the tenth, ten pounds; of the eleventh, 9.08 pounds, of the 12th 8.25. The average pressure is 16.82 pounds, and adding the 12 pounds produced by the condenser, the total average pressure on the piston is 28.32 pounds. The 8 boilers are placed athwart-ship, built on the plan of late Engineer in Chief of the Navy; and, like those of the other Collins steamers, they contain a number of small vertical pipes, heated from the outside; but the main difference is that they are here placed in a return flue. Thus situated, they are neither exposed to the intense heat of the flames just leaving the furnace, nor to the radiation of the burning coal.

The Adriatic is the largest steamship ever built in this country, and is, without exception, the largest vessel constructed of wood in the world. The Persia is some 20 feet longer, but she is an iron steamer. The Adriatic is brig-rigged, and has no bowsprit.

(To be continued.)

THE CUNARD STEAMER PERSIA.

The Cunard Line commenced operations in 1840, with the view of connecting the Eastern and Western hemispheres by the periodical sailings of steamers. The first vessel dispatched was the Unicorn, Capt. Douglass, which sailed from Liverpool on the 16th May, 1840, as a pioneer, for Halifax and Boston, with 25 passengers. The Unicorn was a comparatively small steamer, and when she got out, she was placed on the line from Picton to Quebec, as an auxiliary steamer.

The Britannia was the first steamer built for the ocean line, and she was dispatched on the 4th July, 1840, for the same ports, to which she carried about [illegible] passengers.

Substantially, this company has enlarged the size and power of i' steamers six times since the Unicorn came out, as follows:—

First, the Britainia, Acadia, Caledonia, Columbia.

Second, the Hibernia, Cambria.

Third, the America, Europa, Niagara, Canada.

Fourth, the Asia, Africa.

Fifth, La Plata, Arabia.

Sixth, the Persia.

These vessels may be classified thus:—

The four first, of 1,200 tons and 440 horse-power each.

The Hibernia and Cambria of 1,500 tons and 600 horse power each.

The America, and the vessels named with her, 1,840 tons and 700 horse power each.

The Asia and Africa, 2,500 tons and 800 horse-power each.

The Persia, 3,600 tons and 1,200 horse-power.

La Plata and Arabia, 2,393 tons and 1,000 horse power each.

The Persia is now the largest and longest iron steamer hailing from England, and will only be eclipsed in that country by the Great Eastern. In speed she is a full match for any of our own steamers crossing the Atlantic. Except the Adriatic which has shown a clear superiority in this respect since taking her place on the ocean course.

The dimensions of the ship may be first stated as follows:—

Length between perpendiculars	360 feet.
Length over all	390 feet.
Breadth of hull	45 feet.
Breadth over Paddle-boxes	71 feet.
Depth	32 feet.
Gross tonnage	3,000 tons.
Space for engines	1,221 tons.

The Persia is rigged as a brig, with sufficient spread of canvass to enable her to cross the Atlantic with her sails alone. Her main yard is 76 feet long. The Persia has an elliptical stern, neatly gilt, and a half-length female figure-head, representing a Persian maiden, with musical instruments and other articles of female occupation.

The Persia is the first iron steamship built for the British and North American Royal Mail Steampacket Company, her Majesty's Government having hitherto required wooden vessels in case they should be wai by for war purposes. The keel is 13 inches deep and 4½ inches thick, ar an- in lengths of 35 feet, and a rabbit in the keel for the garboard streylin- fay into. The sternpost is 13 inches broad and 5 inches thick. The ro lar- stock is 8 inches in diameter. The framing of the ship is of angl ns or

placed normally to the stem, at intervals of 13 inches from centre to centre midships, and 20 inches from centre to centre about five feet before and abaft the engine-room bulkhead. Amidships these ribs are 10 inches deep, with double angle iron riveted to each edge, so as to present in section the appearance of a letter H placed sideways, thus ⌶.

The Persia is divided into seven water tight compartments; and a novelty has been introduced into her framing forward which, in the bow compartment is laid diagonally, with a view of bearing a collision, should it ever occur, in the strongest arrangement of the structure. The vessel is plated in and out alternately, in accordance with the present custom of building iron ships. The keel plates are 1 1-16th of an inch in thickness; at the bottom of the ship the plates are 15-16ths of an inch in thickness; from this section to the load water line, they are 3-4 of an inch; and above this they are 11-16ths of an inch in thickness. The plates round the gunwale are 7-8 of an inch in thickness.

Everything that care and skill could devise to make the Persia a safe ship, has been done by Mr. Napier. In the watertight compartment, for example, provision has been made, much the same in principle as that adopted in the Great Eastern, namely the formation of a substantial double ship. The goods carried by the Persia are stowed in watertight compartments, each about 72 feet long, 16 feet wide, and 20 feet deep, which form a species of tanks, sufficient in themselves to float a considerable weight.

The motive power of the ship, which consists of two side-lever engines, constructed by Mr. Napier, are as follows:—

Diameter of Cylinder	100 inches.
Length of Stroke	10 feet.
Diameter of Paddle Wheels	40 feet.
Length of Floats	10 feet.
Depth of Floats	3 feet.
Number of Boilers	8
Number of Furnaces	40
Pressure on Boilers	20 pounds.
Length of Engine-room	115 feet.
Breadth of Engine-room	45 feet.
Capacity of Coal Bunkers	1,400 tons.
Estimated consumption of Coal	4½ tons per hour.

The boilers, which are tubular, are placed in two groups, fore and aft, and they are fired amidships. The ship has been so planned that the weight borne will repose on lines parallel to the keel. The coal-bunkers are placed beyond the boilers, at each extremity of the engine-room. Each boiler has five furnaces, and they are so independent that any one of them can be shut [illegible] should it not be required. In one particular the Persia differs

from the Arabia, the steamer which came last on the line, namely, having smaller boilers, but a greater number of them, so as to enable the engines to follow up the stroke of the engine with a longer pressure of steam.— There are, beside, two donkey-boilers and engines, for pumping the feed-water into the boilers, and in connection with them are eight refrigerators, for abstracting the waste heat from the brine as it is blown from the boilers, to heat the feed water.

From the engine-room to the cabin is a short transition. Here are accommodations for 260 passengers, who will sleep in berths on one deck. There is a passage all around the ship below the main deck. On the same deck is an elegant cabin for gentlemen who desire to sit in the centre of the ship, and adjoining it is the ladies' cabin, which is a gorgeous room, upholstered in a style fit for a queen, and adorned with choice paintings from the pencil of Mr. D. M'Calman, of Glasgow, whose groups of flowers also decorate the main saloon. This cabin is pannelled with bird's-eye maple, and it is heated by steam, as are also all other parts of the ship.— The height between the decks in this part of the ship, is eight feet six inches, and the berths are amply lighted and ventilated. The berths are supplied with the usual conveniences; and it may be mentioned that there are no less than twenty water-closets in various parts of the lower deck.

On the upper deck are the main and fore saloons, the officers' berths, and other accommodations. At the extreme after end of the ship is a large smoking-room, with cabins for the captain and chief officer, from which they can see the entire working of the ship. Next to these is the main saloon, which is 60 feet long, 20 feet wide, and 8 feet high. This saloon will dine about 170 persons. It is pannelled in bird's-eye maple, with twisted pilasters, and neatly gilt frize and ceiling. The upholstery is red velvet, with red satin window-curtains, embroidered in gold. The pannels are filled with floral paintings, similar to the ladies' cabin. Elegantly framed mirrors are placed at the fore end of the saloon, as in the other vessels of the line; but at the after end a difference has been made, by the introduction of two beautiful bookcases, and massive folding-doors which open into the smoking-room. The skylight is filled with stained glass, the prominent features being a Persian and a Persian woman, in their native costume. Forward of the saloon, are the kitchen and pantry, each of which has an area of 300 feet, the floors of which are beautifully laid with tiles. The fore saloon, and the various store-rooms and officers' apartments, are also placed on the main deck, while the crew are accommodated in the topgallant forecastle.

The summit of the saloon and officers' mess-rooms forms a hurricane deck, well railed, on which there is an uninterrupted promenade 370 feet in length, and of proportionate width.

The Persia has two sets of double steering wheels, so that she can be steered either aft or amidships, as circumstances may require.

The crew of the ship is made up as follows:

Engineers' Department—Engineers, 8; firemen, 54.

Steward's Department—Cooks, 8; stewards, 36.

Sailing Department—Officers, 6; able bodied seamen, 64; doctor, 1; purser, 1; carpenter, 1; joiner 1. Total, 170.

Captain—C. H. E. Judkins.

First Officer—William Kelly.

Second Officer—G. D. Hanley.

Third Officer—Robert Shaw.

Fourth Officer—William Thompson.

Purser— —— Dunlop.

Engineer—William Caldwell.

AEROSTATIC TUBULAR DIVING-BELL.

THE new Aerostatic Tubular Diving bell, invented by B. Maillefert, the well known submarine engineer, is considered the most advantageous submarine apparatus of the present age. By this valuable invention, a secure, permanent, and instantaneous communication with the bottom of rivers and harbors is obtained, thus rendering submarine operations comparatively easy. By it, foundations for piers, light-houses, etc., can be laid at much less expense and less labor than heretofore, and the divers can devote their entire attention to the work they have to perform, and need not be under a constant apprehension of accidents, as is the case when working in diving-bells of any other description. Mr. M. has succeeded in accomplishing the great desideratum which has ever been looked for in the art of diving, namely—that of enabling the diver to be perfectly independent of outside attendance, inasmuch as he can at any time go in or out of his bell without disturbing either the men above or the bell below from the position in which it is fixed, and in this respect it is unlike any other apparatus used, where, in all cases, the courageous diver is more or less at the mercy of those above, who oftentimes cannot assist him, through some disarrangement in the machinery, gears, etc., and the poor fellow is left to perish.

Another advantage of great importance in this bell is the uniform light which is admitted at any depth below the surface, the upper lens throw-

ing light down, and being always above the surface, is not likely to be darkened by passing through several feet of water more or less opaque.

There is also a decided saving of time and labor, owing to the fact that when once this bell is fixed in its proper place, there is no need of disturbing it again to send in or out of it men, material, etc.; the entrance is always out of water and ready for use. This saving of time is considerable, as in some cases it is a matter of difficulty and time to place the bell exactly over the spot to be operated upon; besides, the work can be prosecuted without interruption as two or more men can be left to work on the bottom, and still access and egress remains convenient and safe for all necessary purpose.

Again this improved apparatus cannot capsize, the funnel acting as a buoy, keeps it floating steadily within one or two inches of the spot to be operated upon. The ascent or descent is also very gradual by means of this floating funnel.

The whole arrangement is perfectly simple, and cannot very well get out of order, since the only mechanism inside consists of four air-cocks.

But here comes in another most important item—one that surpasses any previous improvement, and that has never been made available: it is no less than the power of conversing, from the surface of the water, with the diver on the bottom—not with various signals, as heretofore, but *viva voce*. The diver can ask for anything he wants, without any extra exertion on his part to talk louder than usual. This, of course, is of incalculable advantage, and makes the whole thing quite perfect.

A single diver can have perfect control of his bell, either from the inside or outside, whether the bell floats on the surface or is near the bottom; he can also go down in it to the bottom and get out in less than two minutes.

A bell on this principle has been built, under Mr. M.'s superintendence, for the Marine Railway Co., at Hunter's Point, and extensive operations have been performed with it to the entire satisfaction of the directors. In one instance this bell was placed in a particular spot, and left six days on the bottom. Carpenters, smiths, etc., went in to work from half-past six until twelve o'clock, returning at one until six, without feeling any inconvenience. They were employed in cutting off large timbers, fitting cast iron frames, bolts, etc., having at all times a surface of 30 feet circumference to operate upon, free of water, in 16 to 18 feet depth.

Information can be had from Mr. Mailler, Marine Railway Office, Wall street, or from the worthy and intelligent agent of the Company, Mr. Levi Hayden, at Hunter's Point, L. I.

Mr. Maillefert is prepared to construct his bell on reasonable terms, model and plans of the same to be seen at his office, 68 Cedar street, New-York.

THE LOSS OF THE CENTRAL AMERICA.

Another of those still recurring ocean calamities against which we have so often declaimed, and for the prevention of which we have constantly been urging the adoption of specific remedies, has taken place in the loss of the steamer *Central America*, heretofore known as the "*George Law.*" We deem the following account of the disaster, contained in the Protest of the principal surviving officers of the Central America, authentic, and omitting the form of oath, &c., submit it to our readers. The officers subscribing to the Protest, are—

James M. Frazer, Second Mate.
John Black, Boatswain.
George E. Ashby, Chief Engineer.
Henry Keefer, Second Assistant Engineer.

"On the afternoon of the third day of September, one thousand eight hundred and fifty-seven, at about half-past 4 o'clock, he, the said James Frazer, set sail and departed in and with the said steamship Central America, as second mate thereof, from the port of Aspinwall, Central America; the said John Black, George E. Ashby, and Henry Keefer, being also on board of said steamship, in their respective capacities above stated. That Wm. L. Herndon was Master, and Charles Van Renssellaer first mate of said steamship, and that the said steamship had on board a cargo of merchandise and treasure, and a large number of passengers, and was bound for the port of New-York, via Havana. That the said steamship was then stout, staunch and strong, had her cargo well and sufficiently stowed and secured, was well-masted, manned, tackled, victualled, apparelled and appointed, and was in every respect fit for sea and the voyage she was about to undertake; that in the due prosecution of said voyage the said steamship arrived in safety at Havana on the afternoon of the seventh of September, 1857, where she remained until about half-past nine o'clock on the morning of the eighth of September, 1857; that the steamer proceeded on her voyage with ordinary weather, and without any unusual occurrence until about midnight, when the wind began perceptibly freshening from the north-east; that the wind and weather continued without much variation until midnight of the ninth of September, 1857, when it began to increase and continued increasing until the morning of the eleventh, when at eight o'clock A. M., it blew a violent gale from north-north-east, with a heavy sea, and the deponents, James M. Frazer and John Black, say that during all this time the ship had kept her course, but had been much retarded by the wind. The deponent, James M. Frazer, was in charge of the deck until 8, A. M., of the 11th, when he left the same in charge of the third officer, who is not here and is supposed to be lost. The ship was then, according to calculation, in lat. 31° 45′ N., and long., 78° 15′. The gale continued increasing until noon, when deponent's watch on deck commenced, and on taking charge of the deck he found the ship still on her course, and was informed that the stern spencer had been set during his absence to keep the ship's head to the wind, but that it had been almost immediately blown away by the violence of the gale, and some canvass had been bent in the main and mizzen rigging as a substitute for it. The deponent, John Black, says he was on deck during the whole of the day of the 11th, and that the storm spencer was set at 10 o'clock, A. M., under the direction of Captain Hern-

don, who was present on deck, and that immediately afterwards the foreyard was sent down by the Captain's directions. These facts were reported to the deponent, James M. Frazer, on his taking the deck at noon. And the said James M. Frazer further says that Captain Herndon and Mr. Van Rensselaer, the first mate, were on deck during deponent's watch; that the ship was enabled to keep her course for about half or three-quarters of an hour after 12 o'clock. The wind was hauling to the northward and westward, and before one o'clock P. M., she was driven by the wind off her course towards the southeast. Up to the time when she was so driven off her course the ship behaved well. At about one o'clock. P. M. the deponent, James M. Frazer was directed by Mr. Van Rensselaer, the first officer, to try the bilge pumps, which order deponent immediately obeyed, and found that the lee pumps worked well and discharged water abundantly, but the weather pumps did not work, there not being water enough in the ship to supply them. The vessel then had a heavy list to starboard, and had fallen off into the trough of the sea. The wheels of the ship were then turning slowly. At this time buckets were being passed into the engine room, but as this work was not under deponent's charge, he devoted his entire attention to his duties on deck. At about two o'clock. P. M., it having been found impossible to get the ship's head to the sea, the forestaysail was set with the object of getting the ship off before the wind; and the canvass was at the same time taken from the main and mizzen rigging, but immediately on being set the staysail was blown to pieces. There was still a very heavy sea, and the gale continued unabated. An attempt was then made to hoist the foreyard with the clues of the foresail lashed to eye-bolts in the deck, in order to get the ship before the wind, but before the yard had been raised three feet from the deck the sail blew into fragments. The jib was then cut from the foretopmast stay to set as a forestay sail, but before it was bent on the forestay, orders were given to get a drag over to try and get the ship's head to the sea. The drag, consisting of the foreyard, with a heavy kedge anchor, was then got over with a nine-inch hawser, bent to the middle of the yard; a larger anchor would have been used, but for the reason that the ship was then so listed over on her beam ends that we could not get the yard to the bow where those anchors were hung, to make it fast to one of them. We veered out on that hawser some forty or fifty fathoms. There were orders given by the Captain to cut away the fore-mast, which was done, and after that we paid out from ninety to one hundred fathoms on the hawser, which was made fast round the stump of the foremast, and let out of the half round forward of the cathead. During this period we were aware that the after pumps were working. The forward pump was not working, as the foreyard from its position, lying across the rail, prevented the working of it. As to the work going on all this time below deck or aft, our attention being entirely engrossed with our duties on the forward deck, we knew nothing of it. As soon as the yard got over as a drag, the forward pump was started and worked. The drag had no effect in bringing the ships head up, and that was the last effort towards that object which was in our power to make. After that we remained for several hours at the forward pumps which were worked steadily; the lee pumps hove water all night; the weather pumps hove water up to about midnight when the chamber burst. The deponent, John Black, deposes that he remained at the forward pump until about six o'clock, A. M. The deponent, James M. Frazer, deposes that he remained at them until about ten or eleven o'clock, P. M., when he went down into the after cabin and helped the persons who were engaged in baling. After having spent some time in aiding and encouraging the bailers, the deponent, James M. Frazer, visited almost all parts of the ship, lending assistance wherever he could be useful, and in doing so he saw that the pumps were worked vigorously, fore and aft, and the bailing was going on with the greatest activity all over the ship. These exertions continued steadily all night. On Saturday morning, the 12th,

about daylight, this deponent, James M. Frazer, having heard one of the passengers express the idea that the pumps were not heaving water, looked over the side to ascertain the fact. The ship was so listed over that he could not see the discharge pipe of the after pump nor ascertain how the fact was with respect to it, but on going forward he ascertained distinctly that the leeward pump forward was heaving water. The weather pump forward had then the chamber bursted, just below the discharge pipe. About half-past five in the morning this deponent, John Black, was ordered aft to rig tackle to the mizzen stay, for the purpose of using whips to heave out the water by tubs, which he did, and thereafter remained there, attending to the bailing out by tubs amidships until he was called away at about half-past two, P. M., to attend to carrying passengers off in a boat to the brig Marine. We had three whips rigged, each over one of the after hatchways, and with each whip we used a beef or pork barrel to heave water over. At about the time that the said John Black was ordered aft, as aforesaid, viz., at about half-past five A. M., this deponent, James M. Frazer, went forward, and having examined the forward pumps, aforesaid, sawed off the chain which was shackled to the starboard bower anchor, and let it and the anchor go. We had endeavored to do this during the night, but had found it impossible. The object of this was to lighten the ship's head; that anchor, with the chain attached to it weighed about two and a half tons. At the same time, by his orders, a derrick was being erected over the fore-hatch, to heave water out of it by tubs and whips. Then deponent went below and rigged two whips between decks, to hoist water as high as the upper steerage, and then discharge it through the scuppers of that deck. At this time the freight room was about one-half or two-thirds full of water, in the judgment of these deponents. Shortly afterwards, this deponent, James M. Frazer, observed that whips had been rigged in the engine-room, and that men were then at work heaving out water with tubs. The bailing then continued all day, down almost to the last moment, with these appliances, to wit: nine whips with tubs, and three gangs of men bailing with buckets. At about twelve o'clock at noon a vessel hove in sight, which afterwards proved to be the brig Marine, of Boston. We had a signal of distress flying from daylight that morning, and the brig approached us, and passing round our stern, rounded to under our lee at about two o'clock P. M., or a little thereafter. As the brig passed under our stern the deponent, James M. Frazer, hailed her by the direction of Captain Herndon, and informed her of our situation, and requested her captain to lie by us and take our passengers, treasure and mails. The captain of the Marine promised to do all he could for us. We had originally had six boats. They were life boats, five of them wooden and one metallic. One of the wooden ones had, during the night before, been washed out of the davits by a sea. We had therefore but five left, and as the gale had abated since ten o'clock on Saturday morning, we received orders from the Captain to lower the boats. The two aftermost boats were lowered successfully; the port quarter forward boat was stove in lowering it. The two boats on the upper deck were launched successfully, but a sea caught the metallic boat and stove it under the guard, when it almost immediately sunk. Under the captain's orders the women and children were first lowered into the boats by bow lines from the lee davits, and by his direction David Raymond, Finley Frazer, and the deponent, John Black, took command of the said boats respectively. The boats pulled away to the brig Marine, put the passengers on board of her and returned, and again took passengers to the brig. The deponent, James M. Frazer, says that it, under ordinary circumstances would have been his duty to take charge of one of the boats, but the Captain requested him to remain on board until the last, which request he complied with. By the time the boats had got to the brig the second time, she had forged ahead and drifted so far to leeward that she must have been five miles off. About 4, P. M., the main spencer was set on the steamer in order to cause her to forge ahead as far as possible, to keep up with the brig in drifting.

The deponent, John Black, states that in these two trips the boat commanded by Finley Frazer and Daniel Raymond became so damaged as to be useless, the one having been stove alongside the brig Marine, and the other having been damaged so as to leak very much and get nearly filled with water. The boat commanded by this deponent, John Black, also became much damaged, and required a man to be constantly bailing, and this deponent also bailing as much as possible. Nevertheless, this deponent, John Black, returned with said boat to the steamer, but by the time he got within hailing distance of her he ascertained that his boat was so damaged that she could not safely take another person on board, and at the same time some one, whom he supposed to be Capt. Herndon, hailed him from the steamer to keep off. This was after dark, about half-past seven P. M., and the ship was then sending up rockets. This deponent, James M. Frazer, states tnat up to this time and after it, the bailing was continued vigorously, but it now became evident that the ship must very soon sink, and at about a quarter to eight o'clock, P. M., or a little after that hour, we gave up baling. During the afternoon, at about three o'clock, we had cut away the hurricane deck and tore down the doors from various parts of the ship, and brought them on deck to furnish rafts for the passengers. At about 8 o'clock, P. M., or a few minutes thereafter, the ship settled rapidly; she took in a little water forward; a few minutes after that two seas in succession washed over her aft. and then a third sea struck her aft, and she righted and went down stern foremost. During the whole gale and up to the last the ship behaved extremely well; she did not ship a sea during the whole gale until after she began to settle, just before sinking, as herein described. The ship's log book was carried down with her, and the said master and first mate of the ship are believed to be lost. And the said George E. Ashby, chief engineer, and Henry Keefer, second assistant engineer, say that their duties having been confined to the engine room, they were not aware of the measures being taken on deck, except so far as they were informed by Capt in Herndon and the other officers, and by occasional observation, but the foregoing statements of Messrs. James M. Frazer and John Black are correct, so far as the knowledge of these deponents extends. And these deponents, George E Ashby and Henry Keefer, further say that when the steamship left Havana, (Sept. 8) the engine and boilers were in perfect order and worked well up to Friday the 11th, carrying an average of 15 lbs. of steam to the inch. and sometimes reaching 18 lbs. That on Friday, the 11th of Sept., the wind was blowing with great violence from the N.E., accompanied by some rain. At 9, A. M., the ship was making water. This fact was reported to Captain Herndon. The listing of the ship to starboard having rendered barrows unavailable, a gang was then formed to pass coal into the fire-room in buckets and baskets. At the request of the Chief Engineer, Captain Herndon sent down nearly all the waiters to assist in passing coal in that manner, and it was so passed as rapidly as possible until stopped by the water, as hereinafter stated. The starboard Worthington pump and bilge injection were next started, taking steam from the main boilers. This was about 10 o'clock, A. M., Friday. The water in the ship was then quite hot, and in consequence of her list, was all in the starboard bilge. The last named pump took water and worked freely, but still the water gained on it. The chief engineer then inspected all the pipes and their connections, and found them tight. At about 12 o'clock the water overflowed the coal bunker floors, both forward and aft, making it impossible for the men to work, the water being heated and the vapor from it extinguishing nearly all the lamps. These facts were reported by the chief engineer to Capt. Herndon, and by his orders steam was immediately got up in the donkey boilers. At the same time a gang of balers, consisting of passengers, was organizen by Capt. Herndon, and another gang worked at breaking up steerage berths for fuel. At 2 o'clock, although every possible exertion was made to keep the fires going, they were extinguished in the starboard boilers by water. Another gang of balers were then at work in the after-

cabin hatches, and still another in the lower steerage. The engineers, men and passengers were working to the utmost of their power. The engines continued working up to one o'clock, P. M., Friday, when they stopped for a few minutes for want of steam. They soon started the steam again, but having only the port fires to depend upon, the steam was soon exhausted. We then commenced firing up with wood and continued doing so till the water rose so high as to put out all the fires, and then the engines stopped. This was between 4 and 5 o'clock P. M., Friday. The Worthington pumps, which had been previously worked by steam from the main boilers, were then worked by the donkey boiler, and continued to work till about 8 o'clock, P. M., with several stoppages of a few minutes each, which were necessarily made to free the feed pipe of the boilers from obstructions. When the donkey engine finally stopped, the feed pipe had become so choked up that it was necessary to cut and repair it. During the night all hands were at work bailing. The rolling of the ship caused a small leak around the starboard shaft, which was stopped with blankets and a sail wrapped around the shaft between the ship's side and the wheel. On Saturday, the 12th, barrels were rigged with a whip and worked in the engine room and in the hatches in other parts of the ship at hoisting water. The deponent, Henry Keefer, cut off the escape pipes and rigged them as pumps in the steerage, one of which worked well. Early on the morning of the 12th steam was again got on the donkey boiler, and the pumps worked well till the rapidly gaining water submerged them entirely; this was about 9 o'clock, A. M.., and there was then between nine and ten feet of water in the engine-room. The machinery being thus rendered entirely useless, the fact was reported to Capt. Herndon, and from that time all efforts were directed to keeping the ship afloat by bailing, and to saving the lives of those on board. The log book of the chief engineer was lost with the ship. And the said James M. Frazer further says, that all the damage and injury which already has or may hereafter appear to have happened or occurred to the said steamship or her said cargo has been occasioned solely by the circumstance hereinbefore stated, and cannot nor ought not to be attributed to any insufficiency of the said steamship, or to any default of her officers and crew.

The following statement of Capt. Badger, one of the surviving passengers, describes the rescue of the lady passengers and children by the boats of the *Central America* and the brig *Marine*, of Boston; also, the subsequent sinking of the wreck, and final rescue of the passengers by the brig *Ellen*:—

At two o'clock, on Saturday, a sail was reported to windward, and at half-past three she came under the stern. Boats were immediately lowered, but two were stove instantly by the sea. Three boats still remained, one in a bad condition. At four o'clock the work of removing the ladies and children to the deck of the *Marine* was commenced. The brig being much lighter than the ship, had by this time drifted away to leeward. The distance was considerable, and the boats were long in making the trips, and there being a heavy sea but few could be carried at a time. After sending the ladies and children, the engineer and some fifteen others were embarked on the brig. By this time it was dark. The work of bailing was still kept up, but the water gained faster and faster upon the vessel. As the boats successively approached the ship, a simultaneous rush was made by the passengers to get aboard, and it was apprehended that the boats would be filled and stove; it was now dark. About two hours before the sinking of the ship, a schooner ran down under her stern, but could not render any assistance for want of boats. The work of baling went on until within an hour of her going down. Two lights of the above vessel were now seen far

to leeward. Rockets were fired from the wheel, but went downward. The immediate sinking of the ship followed. Captain Herndon remained on the wheel up to the moment of her going down, which was eight o'clock on Saturday night. I was standing on the quarter deck. Some jumped over and put off from the now rapidly descending ship, and seized on whatever they could. No one shrieked or cried, but all stood calm. The Captain behaved nobly, and said he would not leave the ship. I promised him I would remain with him, as also did the second officer, Mr. Frazer. All at once the ship, as if in the agony of death herself, made a plunge at an angle of 45°, and with a shriek from the engulphed mass, she disappeared, and five hundred human beings floated out on the bosom of the ocean with no hope but death. At quarter past one o'clock in the morning the Norwegian bark Ellen came running down with a free wind. The cries of distress reached those on deck, and they hove to under short sail. The task of rescuing the passengers was nobly commenced, and by nine o'clock the next morning forty-nine had been picked up. Diligent search was made until twelve o'clock, but no more could be seen. They then bore away for Norfolk, with a fair wind, and arrived at Cape Henry on the 17th, where myself and four others embarked in the pilot boat and arrived in Norfolk.

When the Central America arrived at Havana she reported at the office of the Captain General as follows:

Number of passengers on board	492
" crew "	101
Total	593
Landed at Havana	6
Leaving	587
Havana passengers, about	5
Total on board when she left Havana	592
Saved from Central America	173
Number missing	419

The severity of this gale was almost unprecedented on the southern coast. Upwards of 50 vessels were lost and damaged by it. Its effect on coastwise steamships were as follows:—

Steamship Central America, from Aspinwall, via Havana, for New-York, foundered.

Steamship Empire City, from New-Orleans, via Havana, lost wheel-house, fore spencer, main gaff, &c., &c., and put into Norfolk.

Steamship Southerner, from New-York for Savannah, lost wheel-houses, two boats, smoke stack, threw part of cargo overboard, had six feet of water in her hold, &c., and put into Charleston.

Steamship Nashville, from New-York for Charleston, lost one seaman, named Wm. Catherwood, overboard.

Steamship Columbia, from New-York, for Charleston, had her paddle-boxes carried away, lost part of deck load, and received other damage.

Steamer Norfolk, from Philadelphia, for Richmond, Va., foundered in the Chesapeake. No lives lost.

LIEUTENANT. WM. L. HERNDON, U. S. N., LATE COMMANDER OF THE CENTRAL AMERICA.

Captain William Lewis Herndon was a native of Fredericksburgh, Va., and was the son of Dabney Herndon, Esq., a highly respected citizen of that place. He was born October 25, 1813, and was, therefore, at the time of his death, 43 years of age, twenty-eight of which he had spent in the service of his country. He entered the Navy as midshipman at the age of 15. His first voyage was to the Pacific, in the old frigate Guerriere. This cruise took three years. The next three years he spent in the Mediterranean, in the Constellation, and afterwards made a third cruise to the Coast of Brazil. At this time he was attached to the Independence. About the time of his return the Florida war broke out, and a number of officers in the Navy volunteered for the service. Among them was young Herndon, who was placed in command of a brig at Indian Key. With his men he often penetrated the Everglades in boats, driving the Indians from the recesses of the swamp into the arms of the troops on the shore. In this difficult service, and on the coast, he remained two years. On his return he was attached to the National Observatory at Washington, then under the charge of his brother-in-law, Lieut. Maury. Here he remained three years. This service he found more arduous than life at sea, as he was often necessarily engaged all night in making astronomical observations. During the Mexican war he applied for orders, and was appointed to the frigate Cumberland. He proceeded to Norfolk, and had embarked, when his destination was changed. Commodore Perry, then in the Gulf, had applied to the Department to send out to him an active and intelligent officer, who could speak the Spanish language, to be placed in command of a small steamboat to pass between the American squadron and the troops on shore. The Secretary of the Navy immediately designated Lieut. Hernden for the post, and he was transferred to the Iris, and sailed to join Commodore Perry. In this small vessel he remained till the close of the war, often performing tasks of much difficulty and danger, but with uniform skill and success. At the close of the war he returned to Washington, and spent another year at the Observatory.

It was in the exploration of the Amazon, during the years 1851 and 1852, that Lieut. Herndon chiefly distinguished himself: or rather, it was in the performance of this service that he was more widely known. He was selected "for this most important and delicate duty"—so his letter of instructions ran—because "it would call for the exercise of all those high qualities and attainments that he possessed." The object of the expedition was to obtain every information relating to the valley and river of the Amazon, including the entire basin or water shed drained by that river

and its tributaries. Lieutenant Herndon's observations were to extend not only to the present condition of that valley, with regard to the navigability of its streams, but to the number and condition, both industrial and social, of its inhabitants—their trade and products; its climate, soil and productions; and also to its capacities for cultivation, and to the character and extent of its undeveloped commercial resources, whether of the field, the forest, the river, or the mine. At the time he received these instructions, Lieutenant Herndon was on board the Vandalis, then at Lima, in Peru, and from that point he was directed to cross the Cordilleras and explore the Amazon from its source to its mouth.

Lieutenant Herndon entered upon the duties of his new mission with spirit and enthusiasm. To prepare himself for the expedition, he spent four or five months in researches in Chili and Peru. He then left the Pacific coast, and ascended to the crest of the Andes, and from thence descended the Atlantic slope until he reached the head-waters of the Amazon, which at four thousand miles distant from its mouth, is but a muddy stream known as the Huallaga. Lieutenant Herndon travelled the entire distance from the head-waters of canoe navigation to Para, in an open boat. It occupied him eleven months; and his report to the Government, embodying a faithful and modest account of his journey, should be read by every one interested in the development of the unbounded resources of the mightiest river in the world.

On his return to the United States, Lieut. Herndon was for some months in Washington, engaged in the preparation of his work on the Amazon, which was published by the Government. After this labor was completed, he was ordered to the San Jacinto, then designed to cruise in the Baltic, during the presence there of the allied fleets. But some accident occurring to her machinery, she put into Southampton. This ship was ordered to convey Mr. Soule, who had been forbidden to pass through France, from Calais to Spain. On the return of the San Jacinto to the United States, Lieutenant Herndon was transferred to the Potomac, under Commodore Paulding, but was soon after placed in command of the George Law. This was about two years ago. These California steamers, carrying the United States Mails, are required by law to be under the command of officers of the Navy, and Lieutenant Herndon was chosen for the responsible post.—The name of the George Law was only a few months ago, changed to that of the Central America, the loss of which is now mourned by thousands of hearts.

Lieutenant Herndon was married twenty years since to an estimable lady of Virginia. His wife and an only daughter survive. He was of a slight figure, but of an intrepid spirit; he was as gentle as he was brave. In the Navy he was universally beloved. In all quarrels between officers

he was known as a peacemaker. He never made an enemy. For fifteen years he had been a member of the Episcopal Church. He often read the service on board his ship, and the humblest sailor was not committed to the deep without the burial service read over his remains by his captain.—*N. Y. Times.*

THE YACHT FAVORITA.

The past year was pre-eminently a year for yacht-building and boat-sailing. The enterprise of our fast-going people refuses to be lulled asleep by the unpromising aspect of the "times," and since operations in the clipper or steamship line seem forbidden, the smaller class of vessels and boats opens a field for experiment on a smaller, and safer scale. We hear of yachts being built in many directions and by persons hitherto unknown in this department of shipbuilding, but we are not aware of any great improvements having been made in the models. The bows of some that have come within the orbit of our observation, appear creditable; but the sterns or after bodies scarcely merit this commendation. The aft end is decidedly the more difficult to master in modelling. Even the late George Steers generally done himself less credit on the stern than the bow.

By the politeness of the owners and builder of the yacht *Favorita*, we are enabled to show our readers the elements and lines, together with the rig of this fine pleasure-craft. We had hoped to publish the lines of some others with those of the *Favorita*, but to our astonishment, were refused for the present, in a quarter where we supposed the science of shipbuilding and navigation had a tried patron. If one object of yachting is the improvement of models, we cannot understand the course of members of the Club who would interdict the discussion of the elements of their boats, or who would prevent, by refusing the data, an investigation of those qualities which may constitute one boat superior to another. That the publication of lines and calculations would give facility for *copying* the best yachts, is not a valid reason, to our mind. The copy is by necessity inferior to the original, while it is also superior perhaps to unaided efforts; but the mechanic without originality of talent, who follows the examples of others, need never be feared in results. And the man of culture combined with originality, cares but little for examples—and the best efforts of masters are to him only examples—not copies to be followed. Conservatism has to fear most from the self-taught; these care nothing for precedents when a new development is to be made.

and its tributaries. Lieutenant Herndon's observa- only to the present condition of that valley, with of its streams, but to the number and con- cial, of its inhabitants—their trade and pr- ductions; and also to its capacities for extent of its undeveloped commerc- forest, the river, or the mine. A- Lieutenant Herndon was on bo- from that point he was direc- Amazon from its source to

Lieutenant Herndon spirit and enthusiasm four or five months cific coast, and a- scended the A- zon, which at stream kno- distance boat. I embod by e- the

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en, C..., and is ...e middle, and 9 inches —sternpost sided 9½ ...s ...orward of the foremast... ...ollow: floors, 7½ inches ... ...ks side at keel 5½, tapered ... ...mbers are diminished 5½ and 5... ...mbers are sided 6 and 5½ at ... ...es have double floors. The frame... and hackmatack. Room and space ... body between masts, and 23 to 24 inches ... are 3 inches thick and 4½ inches wide, ... are 2¼ inches thick, increasing at bilge ... Clamps for deck in two strakes, 3 inches ... wide, of yellow pine. Ceiling of white oak, 2 inches ... sided 4¼ and moulded 9 inches, of hackmatack. ... hanging knees under each partner beam, and ... ...sprit beam. Beams forward of mast partners, white oak— ...chesnut, sided 6½ to 7½ inches, moulded 5½ at middle ... ...ds. Deck-plank 2½ inches thick, 3½ inches wide at ... ...to 1½ inches forward and 2 inches aft, without butts ...

...—In keel and keelson, 3-4 and 7-8 inch iron and copper— ...in each frame—in plank two composition spikes and two ... in each frame, secure the first five strakes; and two spikes ... 7-8 inch treenails fasten all above where the width of strake permits. The wales fastened with spikes and half-inch bolts driven through and clenched on the clamps. All the bolts in the deck knees are driven from the outside and clenched inside.

DIMENSIONS AND CALCULATIONS.

Length on the load line, 84 feet; breadth moulded, 21 feet; depth from base line to load line, at dead flat, 6 feet 5 inches; draft of water forward, 7 feet; draft of water aft, 9 feet; displacement moulded in cubic feet, 4169.53 feet; displacement moulded in tons, 119.23 tons; centre of gravity of displacement aft of mid-length, 2.72 feet; centre of gravity of displacement below load-line, 2.28 feet; area of load-line plane, 1151.12 square feet; centre of gravity of same aft of mid-length, 3.22 feet; area of dead flat section, 80.86 square feet; centre of gravity below load line, 2.35 feet; moment of stability, 27708. *Meta centre* above centre ... 6.64 feet; *meta centre* above load line, 4.36 feet.

The *Favorita* was built by Mr. Gesner, at Fair Haven, Conn., and is owned by A. C. Kingsland, Esq. of New-York.

The keel of white oak, is sided 9½ inches at the middle, and 9 inches at the ends. Stem of white oak, sided 9 inches—sternpost sided 9½ inches. The frame-timbers between a point 6 feet forward of the foremast, and one 8 feet abaft of the mainmast, sided as follows: floors, 7½ inches at keel, tapered to 5 inches at deck; 1st futtocks side at keel 5½, tapered to 4½ at deck. Forward of this locality the timbers are diminished 5½ and 5 inches at keel, and 4½ at deck; aft the timbers are sided 6 and 5½ at keel, and 4½ inches at head. The third frames have double floors. The frame is of oak, chesnut, cedar, butternut and hackmatack. Room and space of frames are 22 inches in the midship body between masts, and 23 to 24 inches forward and aft. The wales are 3 inches thick and 4½ inches wide, white oak. The bottom plank are 2¼ inches thick, increasing at bilge to attain the thickness of wales. Clamps for deck in two strakes, 3 inches thick, 11 and 12 inches wide, of yellow pine. Ceiling of white oak, 2 inches thick. Deck-knees sided 4¼ and moulded 9 inches, of hackmatack. Two pairs of white oak hanging knees under each partner beam, and one pair under the bowsprit beam. Beams forward of mast partners, white oak—all others white chesnut, sided 6½ to 7½ inches, moulded 5½ at middle and 5 inches at ends. Deck-plank 2½ inches thick, 3½ inches wide at midship, and tapered to 1½ inches forward and 2 inches aft, without buts in the deck.

Fastenings—In keel and keelson, 3-4 and 7-8 inch iron and copper—2 bolts in each frame—in plank two composition spikes and two one inch treenails in each frame, secure the first five strakes; and two spikes with two 7-8 inch treenails fasten all above where the width of strake permits. The wales fastened with spikes and half-inch bolts driven through and clenched on the clamps. All the bolts in the deck knees are driven from the outside and clenched inside.

DIMENSIONS AND CALCULATIONS.

Length on the load line, 84 feet; breadth moulded, 21 feet; depth from base line to load line, at dead flat, 6 feet 5 inches; draft of water forward, 7 feet. draft of water aft, 9 feet; displacement moulded in cubic feet, 4169.53 feet; displacement moulded in tons, 119.23 tons; centre of gravity of displacement aft of mid-length, 2.72 feet; centre of gravity of displacement below load-line, 2.28 feet; area of load-line plane, 1151.12 square feet; centre of gravity of same aft of mid-length, 3.22 feet; area of dead flat section, 80.86 square feet; centre of gravity below load line, 2.35 feet; moment of stability, 27708. *Meta centre* above centre of buoyancy, 6.64 feet; *meta centre* above load line, 4.36 feet.

SPARS.—Main mast, length, 79 feet; fore mast, length, 77.25 feet; main boom, length, 55; main gaff, length, 24; fore gaff, length, 23; topmasts, length, 30; flying gib-boom, 30.6; hoist of main-sail and fore-sail, 55; area of canvass, 4.593.5 square feet.

The *Favorita* performs well, and is a very comfortable sea-boat. By the rules of the Club, which exact a certain allowance of *time* for excess of area of sail carried above other boats in the match, this yacht has scarcely received her proper share of prizes. It is not improbable that the allowance has been made the wrong way, or too great, in some instances, if we consider the *displacement* to be propelled. Let the qualities of yachts have a fair trial, in which displacement shall be considered as well as area of sails.

A HIGHER DEGREE OF SEA-WORTHINESS ATTAINABLE BY INCREASED STRENGTH.

THE late catastrophe in the loss of the Steamer *Central America*, (late George Law,) by foundering at sea, while other vessels in the vicinity survived the gale, has produced a sensation not soon to be erased. Admitting the statement of the owners and builder—that she was entirely seaworthy—to be strictly true, the necessity of exchanging a seaworthy staunch steam ship for a tiny boat, in a gale on the open sea, and that, because the boat was the safer of the two, is too much to believe, were not the fact before us, and indisputable. We have read all the statements in reference to the loss of this vessel, and can come to no other conclusion than that which has been repeatedly affirmed during the last seven years, which is, that our steam ships are not what they may be. The reason why they are no better, is perhaps, in part, owing to a misconception of the forces which operate to founder them. It is not the power of the wind upon the vessel, but upon the sea, which sets in motion these destructive forces. It is not the motion of the vessel which causes her to spring aleak, but the hydraulic action of the sea. If the vessel were secured at her proper line of flotation, and, held motionless, and at the same time subjected to the hydraulic action of the sea, in a gale, we hesitate not to say that the bottom, with the engine and cargo, would actually drop out, if this action were continued for a sufficient length of time. The weak bilge is often referred to, but the *weaker bottom* seems to be forgotten. We have (with the diagonal iron straps) a unit of strength in the sides the vessel, but what is the per centage of strength in the bottom? We shall see.

Take the keel and keelsons (which are called *the back bone*) of any steamer or sailing vessel of 200 feet length, and suspend them by the ends or by the middle, and they will break into two or more parts by their own weight.

Now there is no material strength in the bottom beyond the keelsons and keel in the direction of the length; the planking and ceiling are flatwise, and if suspended in the same manner, would be subjected to the same fate. It is true that in steamers, there are engine keelsons, but as every engineer knows, they are scarcely equal in strength to the power of the engine in its direct thrust upon the bottom, and these keelsons are short and placed upon the weakest (which is the broadest) part of the bottom. The engine cannot hold the vessel from working, but on the contrary the vessel is expected to hold the engine, which it cannot do securely with the present mode of construction; hence the reason why the engines of steamers so frequently break down during storms. It is too often forgotten that the law of equilibrium in fluids causes the direction of the pressure to extend in all directions at right angles with the exterior surface of the bottom and sides. How the present practice can be be reconciled with the principles of mechanical consistency, it will be difficult to tell.

A vessel is not considered sea-worthy, if her lower deck and bottom are beyond a given distance apart; and if she has a depth of eighteen to twenty feet hold, she must have two decks and a bottom, *all flatwise* in resisting hydraulic action of the waves at sea. Now as the wave acts in both directions, or as the effects are felt in two ways, let us look at the breadth of the vessel; a middle deck or partition is required if she has twenty feet of depth; but she may have fifty feet of breadth, and nothing is said about a middle side or partition, or in other words, a longitudinal bulkhead, to resist the action of the sea on the bottom. In some cases transverse bulkheads have been substituted; but this only increases the danger—for if one of these compartments at the ends of the vessel should leak and fill, the leverage on the weak middle, would be greatly increased, and would most likely be the direct cause of breaking her in midships. In some instances there have been attempts made to give longitudinal strength by a wooden bulkhead fore and aft; but all wooden bulkheads whether longitudinal or transverse, are combustible, and are liable to shrinkage, and cannot be kept water-tight without frequent caulking, which would most likely be neglected; besides, the wooden bulkhead around the boilers, has too often proved fatal to human life by taking fire. Our ships all require more longitudinal rigidity; this can be obtained better with iron than with wood; the coal bunkers of our steamers should be made of sufficient strength to support the base of the bilge, and then with a midship iron keelson of three or four feet of depth, as the case may require, according to the thickness of the iron and length of the vessel, and a sufficient number of transverse bulkheads; our steamers if in all other respects staunch and well fitted, WILL NEVER FOUNDER IN AN OPEN SEA, nor will they need to be exchanged for an open boat, unless the vessel is on shore or on fire.

It may be proper to show what amount of keel and keelson a steamer of two thousand tons should have, in order to be as strong as the boat which hangs at her davits. The keel should be of one length, sided twenty inches and moulded nine feet deep, with a keelson of the same size. This cannot be obtained, but its equivalent may be found in the above suggestions, and without increased longitudinal strength, our ships cannot be shown to be as strong and staunch as the boats they carry.

THE SIDE SCREW STEAMBOAT EUREKA

Captain H. Whittaker, of Buffalo, has had built during the past summer, a new boat to test his invention of side-screws; she now lies at Jersey City, receiving the machinery, and will doubtless make a trial trip before the issue of our next number. We propose now to call attention to this most interesting experiment thus on the eve of developing the utility of this novel application of the screw, at the *side* rather than the stern, and mainly emerged instead of submerged. The model is a very fast one—dimensions as follows:—

Length on deck, 210 feet. Breadth of beam, 28 feet. Depth of hold, 6 feet. The floor is long and flat, and the draught light. About two-thirds of the boat's length is *bow*—the remaining third stern. The screws will be made right and left, so as to throw the current from the blades into the run on both sides; they are situated just abaft the main breadth, and this feature is calculated to avoid the necessity for a longer run aft. It remains to be seen whether by this mode of propulsion, the length of vessels can be thus reduced on the posterior end.

The engines will be oscilating direct acting, one pair employed to drive each screw, there being one on each side, of 14 feet diameter, and 25 feet pitch, dipping about 5 feet into the water. The cylinders are 24 inches diameter, and equal stroke, supplied with high pressure steam of 100 pounds. The boiler is a new one, also of Capt. Whittaker's invention, the principal features being the upright cylindrical form, with vertical return tubes in the inner boiler (there being one within another). The furnaces are circular grate bars, with two fire-doors, one opposite to another. Each boiler is 9 feet diameter, and 18 feet high, and will furnish an ample supply of dry steam.

When the trial is made, we shall furnish our readers with accurate and full information of the results. There are many practical men awaiting the *finale* of this grand experiment, which, if successful, will doubtle lead to a revolution in the application of steam on shipboard for propul -v purposes.

NOTICES TO MARINERS.

The Navigation of the Neva.—The following notice, issued by the Russian Ministry of Marine, relative to the navigation between Cronstadt and St. Petersburg, was posted at Lloyds, London, Sept. 4:—

Russian Consulate General, London, 17–29 Aug., 1857.

Notification.—Captains of merchant vessels of a great draft of water having, notwithstanding the injunction to the contrary of the competent authorities of the ports of Cronstadt and St. Petersburg, and even without pilots, entered the Channel of the Neva and run aground, causing thereby great obstruction to the navigation of the channel, the Imperial Ministry of Marine has issued the following regulations:—

The captains of merchant vessels are enjoined—

1. To conform themselves strictly to the directions of the commanders of the guard ship and light vessel.
2. Not to enter the channel unless they have a pilot.
3. Not to attempt the passage from Cronstadt to St. Petersburgh, or vice versa, if their vessels, when loaded, draw more than eight feet; and in the contrary case either to lighten the vessel or to come to an anchor upon the first requisition to that effect made by the commanders of the guard ship and light vessel.
4. Any vessel, of whatsoever nation or dimensions which, notwithstanding the injunctions of the competent authorities, shall infringe the above mentioned regulations, will be liable to pay a fine of 25 silver roubles.

Notice is hereby given that the following buoys have been placed in Plymouth harbor:—

East end of Brown's Bank, nun buoy, 2d class, black, No. 1.
Brown's Island, spar buoy, 42 feet, black, No. 3.
Saquish Point, spar buoy, 42 feet, red, No. 6.
South Point of Muscle Bank, spar buoy, 42 feet, red, No. 8.
Dick's Flat spar buoy, 40 feet, black, No. 5.
S.E. point of Captain's Flat, spar buoy, 40 feet, black, No. 7.
West side of Muscle Bank, spar buoy, 40 feet, red, No. 10.

In entering this harbor bring Gurnet lights in range, and when within one mile of them, or midway between the lights and the nun buoy on Brown's Bank, black No. 1, steer W. by S. two miles until abreast of Saquish Point buoy, red, No. 6. Then steer W. ½ N. three quarters of a mile, passing midway between Muscle Bank buoy, red, No. 8, and Dick's Flat buoy, black, No. 5. Then steer north and anchor under the lee of Muscle Bank in from 5 to 8 fathoms water, or continue on the same course between Captain's Flat buoy, black, No. 7, and Muscle Bank (west side) buoy, red, No. 10, and anchor in the Cow Yard, in from 4 to 5 fathoms water.

This harbor affords good protection to vessels overtaken by easterly weather and unable to get into Boston. The least water on the bar between Gurnet Lights and Brown's Bank at low tide is 21 feet.

Red buoys, with even numbers, must be left on the starboard hand; black buoys, with odd numbers, must be left on the port hand; buoys with black and white perpendicular stripes are in mid channel, and may be passed on either hand; buoys with red and black horizontal stripes are on obstructions, with channels on either hand.

Bearings and courses are magnetic.

C. H. B. Caldwell, Light-house Insp., 2d Dist.

Boston, Sept. 3, 1857.

Notice is hereby given that the Black Can Buoy, of the 3d class, has been removed from Graves Ledge, and the Bell Boat replaced upon that station in its stead.

C. H. B. Caldwell, L. H. Inspector, 2d Dist.

Boston, Sept. 4, 1857.

The Alden's Rock Bell Boat, off Cape Elizabeth, Portland, Maine, which broke adrift on the night of the 12th August, has been repaired and replaced at her former moorings, and the nun buoy placed temporarily in her position, has been removed.

This Bell Boat is moored in fourteen fathoms of water, distant about five hundred yards S. E. ½ S. by compass from the shoalest part of the rock, and should be left on the port hand by vessels entering Portland harbor.

GEO. H. PREBLE, L. H. Ins. 1st Dist.

Portland, Me., Sept. 4, 1857.

Notice is hereby given, that the Beacon Light of the Cliff Beacon, ranging with the Stake Light for entering Nantucket harbor by the Eastern channel, will be changed on the first of October, from a fixed white to a fixed red, and continue so until further notice.

By order of the Light House Board.

C. H. B. CALDWELL, Light-house Inspector, 2d Dist.

Boston, Sept. 8, 1857.

NEW LIGHT-HOUSE AT DUTCH ISLAND, RHODE ISLAND.—A new light-house and keeper's dwelling having been erected on Dutch Island, R. I., in place of the old one, the temporary light exhibited during the erection of the new buildings, will be discontinued on and after the 25th instant, and the light exhibited from that time from the lantern of the new tower.

The dwelling-house and tower are built of brick in connection, and both whitewashed.

The base of the tower is 20½ feet, and the centre of the light 56 feet above mean low water. The light will be fixed, of the natural color, and visible around the whole horizon; produced by a fourth order catadioptric illuminating apparatus of the system of Fresnel, and should be seen from the deck of a vessel fifteen feet above the water, at a distance of fourteen nautical miles, under ordinary states of the atmosphere.

E. B. HUNT, Lieut. Corps Engs.

Bristol, R. I.. Sept. 11, 1857.

Notice is hereby given that the Spindles on False Spit and Bird Island, in Boston Harbor, have been changed in color from black to red.

C. H. B. CALDWELL, Light-house Ins. 2d Dist.

BOSTON, Sept. 14, 1857.

On or about the 25th Sept., the Jane Island Light Vessel (Tangier Sound) will be returned to her station, and the schooner placed there temporarily, be withdrawn.

W. H. MURDAUGH, L. H. Insp., 5th Dist.

Norfolk, Sept. 17, 1857.

LIGHT-HOUSE AT HORTON'S POINT, LONG ISLAND SOUND.—On the evening of the 15th day of October, 1857, a 3d order catadioptric *fixed light* will be exhibited for the first time from the light-house tower at Horton's point, north shore of Long Island.

This light-house tower is 30 feet high, built of brick, and the light will have a focal plane of 110 feet above the mean level of the sea.

This tower is attached to the keeper's dwelling, which is also of brick.

The approximate position of this light-house is

Latitude 41° 5′

Longitude 72° 26′ 15″

11 3-4 nautical miles W.S.W. from Plumbe Island Light-house.

J. C. DUA[illegible] Engineers.

Engineer's Office, 3d L. H. Dist., New-York, Sept. 21, 1857.

Notice is hereby given that the Nantucket Sc[illegible] been re-paired, has been replaced upon her station, and th[illegible]

C. H. B. [illegible] l dis.

Boston Sept. 27, 1857.

PARTICULARS OF LIGHTS RECENTLY ESTABLISHED.

[Bearings Magnetic.]

F. fixed. Fl. Fixed and Flashing. R. Revolving. I. intermitting. Est. Established. m Mean level of the sea.

Black buoy, Mother Bank, to mark channel to Pitt Coal Depot.
St. Croix River, Big Island, F, 40 feet high, can be seen 11 miles distant, Est. 2d Feb. '57.
Boston harbor, Spit of the Narrows, F, 35 ft high, Est. 1st Aug. '56. Red. On screw piles of iron.
Martha's Vineyard, Gay Head, R., 191 ft high, seen 20 miles. Est. 1st Dec, '56. Interval 10 seconds, in which bright flash appears.
Calibogue Vessel, L. I. Sound, 30 ft high, Est 1st Aug, '56. Between Grenadier shoals and eastern breakers, off Hilton Head.
Dardanelles, Cape Hellas, R, Est July, '56.
Gallipoli, West Point, R, " "
Fog Bell, Mt. Desert Rock, Est Aug, '56. Fifty ft above the sea, strikes 7 times a minute.
Fog Bell, Matinicus Rock, " " " " " 10 " "
Buoy, Delaware Bay, Cross Ledge Shore. To indicate foundation of a lighthouse.
Chandeleur Island, near former, F, 50 ft high, seen 13 miles, Est 15th Aug, '56.
Cape Race, Newfoundland F, 180 ft high, seen 17 miles, Est 15th Dec, '56, in 46° 39' 2" N, 53°, 2' 6" W. Visible bearing from SW by W to E, and in any northerly direction between them by compass.
Skaw, Kattegat. Present light partially eclipsed by new light tower.
Hielsu Island, Kattegat, 56°, 8' N, 10° 48' E, I, 164 ft high, seen 19 miles, Est 15th Nov, '56. A strong glare of light, of 15 seconds duration, will be preceded and followed by 25 seconds of darkness, and then followed by a steady light of 2m 55s duration.
San Francisco, Cal, Pt Bonita, 270 ft high, 1856. Fog bell only.
Deep Hole Rock, Massachusetts, 1856. Fog bell and day mark.
Fly or Green Island, Maine, Edgemoggin Reach, 25 ft high, seen 7 miles, Est 2d Feb, '57.
Maceio, Brazil, 9° 39' 3" S, 35° 41' 4" W, I, Est 1st July, '56 A strong glare of 12s duration will be preceded by 16s of darkness and followed by 12s of darkness; an interval of 70s of steady light will follow, and the above will be repeated.
Absecum, New Jersey, F, 167 feet high, seen 20 miles, Est 15th Jan, '57, in 39° 2' 2" N, 74° 25' W
Beaver Tail, Newport, F, 80 ft high, seen 14 miles, Est 20th Oct, '56.
Sulina, Black Sea, 45° 9' N, 29° 41' E, F, 65 feet high, seen 15 miles, Est 15th Sept, 56.
Fidonisi, " 45° 15' 5" N, 30° 14' 9", R, 195 " " 18 " " 15th Oct, '56. Serpents Isle.
Kum Kaleh, Asia, Dardanelles, 50 ft high, seen 4 miles, Est 15th Sept, '56. Appear as one 1 3-4 miles off.
Sazalnitzk Spit, Taganrog, Azof Sea, 2F, 34 ft high, seen 7 miles. Light-vessel shifted to south side of channel, and to be left to the southward. Two lights vertical.
Cape Hancock, Columbia River, 46° 16' 6" N, 124° 2' W, F, 230 feet high, seen 22 miles, Est 11th Oct, '56. N side. Tower white, 40 ft. A fog bell stands before it.
Weser river, ent. on Hohe Weg Flat, 53° 42' 8" N, 8° 14' 9" E, var. in 1856, 18° W, F, 112 ft high m, seen 15 miles, Est 1st Dec, 56. Seen only bearing from SE by E, round southerly and easterly to N., Bears S by E ¼ E from outer light vessel; inner light vessel removed. In same tower a red light, 44 ft high will be visible from vessels entering the Dwasgat Channel, disappearing when she is to starboard near buoys H and J, and when in line with the black W A buoy. At the distance of 7 miles it appears white, and is only visible when bearing S by E 3-4 E, round southerly to W by N.
Weser River, ent on Wanger, Oog Island, E extreme, 53° 47' 4" N, 7° 54' 2" E, var, 1856, 18° W, R, 100 ft high m, seen 12 miles, Est 1st Oct, '56, on W side entrance. Interval of revolutions, 2 min. EbN 1700 ft from it stands a beacon, the Weser buoy lying between them on that line. E¼S from it is the outer light ship.

THE

U. S. Nautical Magazine,

AND

NAVAL JOURNAL.

VOL. VII.] FEBRUARY, 1858. [No. 2

THE LATE HENRY ECKFORD.

DELICACY has hitherto kept silent the feelings of sorrow and respect universally entertained in regard to this gentleman. There is a sanctity in deep affliction, which restrains the open expression of panegyric, the warm, though mournful promptings of friendship. But to be longer mute would indicate a cold indifference, an unsympathising forgetfulness, both culpable and untrue.

Mr. Eckford was, in every respect, an extraordinary man. Of this his history is a series of proofs. He seems to have been one of those uncommon persons, whose destiny for weal and woe, whose character and actions, are marked with importance, and indicate magnitude and greatness.

He was a native of Caledonia, a country well and justly famed for the intelligence, mental power, hardihood, and virtue of its people. He was born at Irvine, March 12th, 1775, and was blessed with an excellent education and a sound constitution. At the age of sixteen he was sent out to Canada, and placed under the care of his maternal uncle, Mr. John Black, a shipbuiler of some eminence at Quebec. Here he remanied for some three or four years, and in 1796, when at the age of twenty-one, he commenced his labors as a shipbuilder in New York.

By untiring industry and close a [illegible] ness, he soon acquired a large circle of friends. His ind[illegible] ught was at once manifested in his superior type and [illegible] is. His ships excited general attention, and even a[illegible] ne Philadelphia stood in high repute as a shipbuild[illegible] well be supposed that merit alone would induce th[illegible] of Brotherly Love, to yield the palm of superio[illegible] it such was the force of Mr. Eckford's mechanical [illegible] upied the foremost rank among shipbuilders, and g[illegible] uilt ships bor[illegible]

of praise from all competitors. Being quite as conversant with the theory as with the practical parts of his profession, Mr. Eckford was both able and ready to give reasons for whatever improvements he advanced.

His fertile mind suggested progress in the construction of all descriptions of vessels; nor was his progressive march confined to the model alone. He relieved the ships he built of the ponderous skeig and cumbrous buttocks, so detrimental to vessels of his time, rendered so by the long low transom, which gave a heavy appearance to the stern, and impaired both the sailing and steering qualities. He carried his improvements also to the spars and rigging, while the great essentials were not overlooked. Stability, speed and capacity, were among the first considerations which engaged his mechanical mind. His experience was of the right kind. Upon the return of a vessel built by him, from a voyage, he obtained from her commander an accurate estimate of her qualities, under all the casualties of navigation, asking such questions as enabled him alone, to determine what were her real faults, if she had any, and furnishing him at the same time with the knowledge for improving upon the next vessel he built. He was no copyist; nor was he ever at a loss in recognizing a constructive fitness for the purpose, or proportion to effect the object designed.

Mr. Eckford contracted matrimony, and had become identified with the interests of his adopted country, before the embargo, which preceded the war of 1812. The condition of our country during the first two years of the war is no doubt well remembered. It will be recollected that our invading operations of the enemy's country were disastrous, our difficulties numerous, our losses terribly severe.

The credit of the Government was greatly depressed, its resources materially crippled, and, save the brilliant achievements of our naval heroes, nothing for a while occurred to dissipate or diminish the dread, dismay, and gloom that hung around us. On our Northern frontier, the arms of our country were peculiarly calamitous. Defeat, suffering and misfortune, had attended every effort. The enemy were strong in numbers, excellent in discipline, with the pride and sense of victory, added to the boldness of success, and were ready to devastate and desolate that section of the State. In that dark season of peril Mr. Eckford freely and fearlessly stepped forward. He entered into large and extensive contracts to take mechanics from the seaboard to the lakes, and there to construct our fleets. The country was comparatively wild and uninhabited, the winters long and severe; provisions and men, with the iron, tools, rigging and sails, were to be transported from the sea-coast; the timber was still waving in the forest; and, to crown the whole, the funds provided by the government were in such bad repute, that, to obtain current funds therefrom Mr. Eck-

ford was obliged to give his personal guarantee. Under all these embarrassments, he commenced operations with his accustomed activity and judgment, originated and organized his plans, offering every inducement to the interests, to the pride and patriotism of those in his employ, to labor to the extent of their ability. On many parts of the work the apprentices were placed on one side of a vessel in equal numbers with the journeymen on the opposite side, and a premium offered to the apprentices to outwork the journeymen; and we may add, they seldom failed to secure the award. It was remarked by one of the apprentices of Mr. E., who, in after years, became a prominent shipbuilder, that he was in possession of more wealth at the close of his apprenticeship than at any subsequent period of his life.

Mr. Eckford sent out his foreman a few days in advance, while he remained in New York to complete his arrangements. When he arrived at Sackett's Harbor a frigate was laid down, and the moulds were in the forests of the surrounding country. Encouraged by the presence and example of Mr. Eckford, the mechanics entered upon their labors with enthusiasm, and neither day nor night saw a respite to their toils. The consequences were quickly apparent. A respectable fleet was soon afloat, and our frontier preserved from the invasion of a foe as active and persevering as ourselves. The gallant Cauncey and his compatriots would have vainly exerted their courage and seamanship, had not their efforts been seconded by the skill, enterprise, powers of combination, and the inexhaustible resources of Henry Eckford.

Nor were his operations confined to the war fleet of Lake Ontario. It was through his instrumentality and counsel that the construction of the fleet on Lake Erie was placed under the direction of Noah Brown, while Mr. Eckford himself was looked up to as Consulting Constructor. He not only built the fleets, but raised the funds to fit, man, and sustain them, relying, like a true patriot, on the honor of his country for reimbursement. At the close of the war, not only his own accounts, but those of Noah Brown were entrusted to him for settlement, involving an amount of several millions of dollars, all of which were promptly and honorably settled with the Government. Mr. E. returned to New York to pursue his vocation of building ships, where his genius tow[illegible]at of his compeers, and gave him an abiding place in th[illegible]w citizens. Professional pride induced him to [illegible]om the Secretary of the Navy to become Naval Co[illegible] Navy Yard. The Hon. Secretary was desirous o[illegible] ship that should serve as a model for future [illegible]though this ship was built and launched in 1820, wh[illegible]mission, she was for near twenty years kept out [illegible] ore

Rodgers, whose influence predominated in the Board of Navy Commissioners, for the sole reason that Mr. Eckford would not succumb to dictation in the line of his profession. Yet we believe it is generally conceded that in the Ohio such a model has been obtained.

But his operations were not limited within the orbit of his adopted country. Among other distinguished marks of confidence in his skill as a marine and naval architect, he was called upon to build four frigates for the South American Republics. These were pierced for sixty-four guns, and were built within a short period of eighteen months. In these cases his accounts were promptly adjusted, and he received from all parties highly honorable testimonials. It was while these frigates were in progress of construction that we first learned the keen perceptive powers of his mechanical vision. It was our province to operate upon the head, stern, and quarter-galleries of those ships, and although but a beardless boy, we had frequent opportunities of testing the truthfulness of those household words which ascribed to Mr. Eckford such large mechanical and scientific views. But his power of combination was equally great. As an instance of his usefulness to his country in the mere pursuit of his business, we may mention the fact, which is established by evidence of record, that in one year he introduced, for shipbuilding, and distributed among our mechanics, two millions of dollars of foreign capital, and among the industrious classes there were 1200 working men employed by the day.

Nor were his powers confined within the orbit of sailing vessels. He had built a steamship called the *Robert Fulton*, to ply between New York and New Orleans. She was of 1000 tons, and performed even beyond expectation. The sudden death of her owner, in connection with other circumstances, caused her to be sold, and it was no slight commendation of her model, for that most important of all qualities—*stability*—that when she was afterwards rigged into a sailing vessel, with a battery of twenty-four guns upon her deck, that she became not only the most efficient sloop of war in the Brazilian, but in any of the navies of Europe. He received an invitation from the Government to furnish a plan for a new organization of the navy. This was promptly presented, and was pronounced by all who read it to be exactly adapted to the most efficient and economical administration of that important arm of national power. A change of administration prevented its adoption, and deprived the country of the benefit of his counsels.

In order that a just appreciation of his complete efficiency in the line of his profession, we deem it important to refer to his mode of fastening the *Ohio*. This vessel had all her important fastenings, whether horizontal or vertical, driven with a battering ram; her knee bolts were thus driven, and when the ship was repaired, some twenty years afterward, when the

planking was decayed, these bolts had to be drifted out in the same manner. His taste in giving his vessels a light appearance—in a word, in making a large ship look small, was not equalled in his time. His heads were copied, his sterns were imitated, because of their inexpressible adaptation and fitness. He did not, as too many do in the present day, use one type of head and stern for all vessels, but he made the head fit the bow, and the stern was adapted to the posterior end of the vessel.

At this epoch of his life he was often requested to accept offices of trust, honor and profit. He generally declined them, though in some instances was induced by pressing solicitation to yield. Once he was a representative from this city in our Legislature, and his coadjutors will readily call to mind the astonishing sagacity and large grasp of intellect by him manifested on that occasion.

He seems to have possesed all the essentials of human happiness, as far as friends and fortune could furnish. He was in sound health and an excellent temperament of mind; was affluent, caressed and beloved. His friends—we may say they were co-extensive with the nation—held for him the purest sentiments of esteem and respect. He enjoyed the blessed comfort of applying daily his great means to improve the condition, to lighten the difficulties, to alleviate the misfortunes of his fellow men. The poor loved him. He was the staff of the helpless. The proud willingly paid him homage; the children of Genius, the intellectual and endowed, knew him with sentiments of devotion; the mechanics gloried in him as the great advancer of their interests, the champion of their rights; the chivalric, the brave, the patriotic revered him, and all good men justly considered him as a faithful and efficient citizen; while the moral rectitude and benevolence of his heart brought its consquent reward.

Alas! the happiness of this world is but "as the early dew and morning cloud, and life and its vicissitudes only a brief and varied dream. It pleased Providence, when this happy vision was in its brightest glow, to destroy it, and he was suddenly brought to the trial and endurance of dreadful and numerous calamities.

We pass by that train of dark and harrowing remembranbes. Now that the excitement, the shock and conflict of those days have subsided, it is the wish of all that they could b [illegible] moved from their recollection. But the conduct of this g [illegible] time of adversity cannot be forgotten. His loss of pro [illegible] e. He was subjected to the bitter sense of unjust repre [illegible] e accusation and trial; of public injury, to all the wro [illegible] flict mental torture on the heart of an honorable man. [illegible] ral of his children, beings whom he loved with a stren [illegible] ver surpassed in this world, were, under awful circumst [illegible] ne in the grave!

There was no complaints—no murmurs. There was the calm, silent, mute suffering of a great and virtuous spirit, struggling to maintain its balance—the unyielding fortitude, the meek submission of a man strong in his innate, unwavering, though wounded integrity, to the will of heaven; and the tear and the sigh, though somotimes irrepressible, and the inward agony, though sometimes eloquently expressed in his countenance, were the only language which told the grief he suffered.

Time brought reason to his misguided adversaries, and mitigation of his sorrows. He directed his attention to emancipate himself from his difficulties, and successively removed one by one, and the weight of them was effectually lightened, and the star of his destiny again arose.

* * * * * * * * *

One morning in the month of June, 1831, a sloop of war of beauteous proportions, and excellent in strength and workmanship, was seen to be at anchor in the North River, armed, equipped, and ready for sea. Scarce a whisper had been heard of her existence, and none could tell where she belonged, or where she was bound. She was regarded as a nonpareil, and curiosity and admiration were equally excited by her appearance. In a few days it was discovered that Mr. Eckford had built her, owned her, and with her had departed from the United States!

Some months afterwards it appeared that this gallant vessel had reached Constantinople, and was there the theme of wonder and delight; that she was sold by Mr. Eckford to the Sultan, who had employed Mr. Eckford as the chief artificer of the Navy, and various after accounts announced to us that in spite of the barriers of another language, and of Turkish prejudices; of the difficulties incident to his being a foreigner and a stranger; that there he was, again the esteemed and the powerful! had become the personal favorite of the Sultan and his people; that the Sultan was his warm friend, and had honored him with high office and marked distinction!

Affluence was again in his reach, and he was enjoying the sweet hope and expectation of retrieving his fortune, and of returning to his friends and his home. It was otherwise destined. In the midst of his career, he was suddenly consigned to the tomb!

The estimate of human character is generally fallacious. The picture is often drawn by the partial or prejudiced, and in the constant and inevitable conflicts of life, men, from being placed in deceiving positions, are apt to be much misunderstood.

Mr. Eckford had the peculiar advantage of deserving the admiration and respect he received in every situation, and mature consideration leads to the conclusion tnat he was not in his life-time sufficiently appreciated.

Prosperity he enjoyed with modesty, sorrow he endured with fortitude, and calmness and discretion he possessed in all situations. The virtues of his head and heart were in apparent perfection. If any fault can be assigned to him, it is the impression that none of his fellow-beings were vicious from innate depravity; none inaccessible to a reforming power, when directed by kindness.

He was of great humility of spirit, was social and affable to all. The highest joy of his bosom seemed to be the pleasure of assisting and benefiting others. His benefactions he extended to all, without distinction. None applied to him in vain. To men unfortunate in business, and pressed down in spirit and credit, he has been known to send funds, and even to pay their debts in large amounts, and start them anew on fortune's road. To young men he would loan capital for business. Many a respectable man of property now lives to say truly that he owed his prosperity, perhaps salvation from ruin, to his timely assistance. And more than one rival shipbuilder has been placed on the high road to wealth through his munificence.

The rich and the poor, the outcast and the caressed—all reaped the benefit of his kindness—all regarded him as their friend. The unfortunate and the miserable were the especial objects of his bounty; the obscure and the aged the peculiar objects of his attention: in fact, all within the sphere of his influence shared his blessings. His beneficence, like the sun of heaven, shone upon all with equal warmth, with equal brightness; and the exquisite delicacy and feeling with which he conferred a favor gave grace and value to the kindness.

In his manners and deportment he was singularly happy. A primitive simplicity—the honest embellishment of nature—was in every gesture, in every expression, and there was a quiet gentleness about him that won all hearts, and endeared those of every age. Little children loved to be with him, and were delighted with his kind and winning ways to them. In his social and domestic relations few men were more blessed; his home was the shrine of felicity; its inmates adored him.

His mind, indeed, was great. His sagacity and perception of the capacities of men were singularly powerful. His quick adaptation of means to an end; his lofty views on general subjects, his intelligence, judgment, and power of idea, were all extensive. Whatever h
wherever he breathed, there were clear manifestations of a
spirit.

His moral virtues were of the highest order, his sense of right
refined and accurate; his regard for the strict fulfillment of
promise and engagements, scrupulous to an extreme. His
things were regular, prudent, and exact; and for t

proverbial. Indeed, in everything, take his character all in all, and we find it an uncommon union of great talents and great virtues, in all their teachings and shadings, and in all their blendings beautiful and harmonious, and lovely to contemplate. Yet difficult of description, having colorings which no human language can describe. Difficult as the hues of the western heavens at eventide; and his life and its rare vicissitudes have in appearance more the character of fairy tale than the reality of truth.

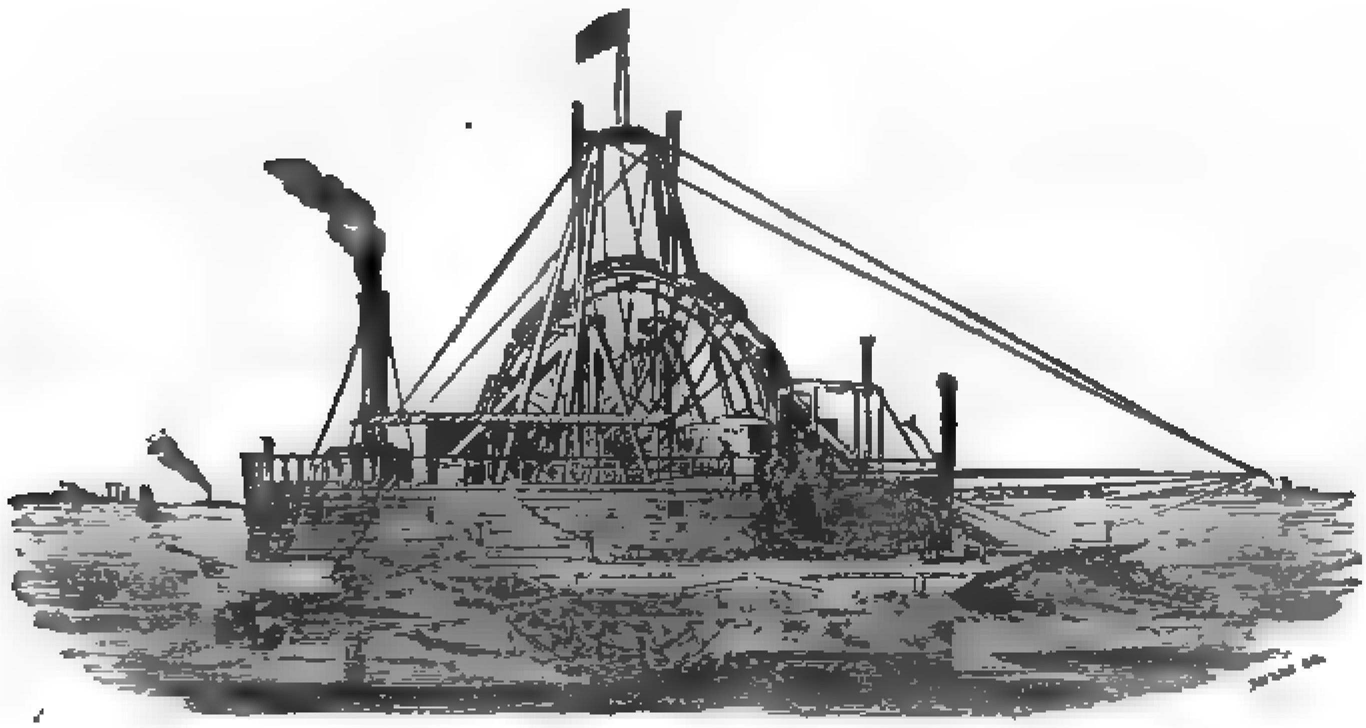
It is said that one of the last acts of his life was to redeem, at a high cost, a Greek girl from bondage, and restore her to her parents. Well indeed might the leader of the Ottomans say, "he was a great man."

FOREIGN ARRIVALS AT THE PORT OF NEW YORK,

FROM 1841 to 1857, INCLUSIVE.

Year.	*Foreign Arrivals.*	*No. of British vessels.*	*Passengers arrived fm for'n ports.*	*Passengers arrived fm for'n ports.*
1841	2,118	334	57,337	—
1842	1,960	339	74,949	—
1843	1,832	277	46,302	—
1844	2,208	324	61,002	—
1845	2,044	276	82.960	—
1846	2,289	280	115,230	—
1847	3,147	730	166 110	—
1848	3,060	754	191,909	—
1849	3,237	811	221,799	—
1850	3,487	661	226,287	—
1851	3,888	966	299,081	18,207
1852	3,822	1,013	310,335	12,158
1853	4.105	945	299.425	15,517
1854	4,173	809	331,809	15,929
1855	3 891	610	152,234	13,400
1856	3,809	719	159,284	11,925
1857	3,908	715	203,500	11,265

STEAM DREDGE LEVIATHAN.



We have been furnished by Messrs. Livingston and Crocheron, of 13 Park Place, New York, the agents of this rotary dredge, (through Mr. Thos. Main, who made the designs,) with a full description, and an opportunity of seeing it in operation.

This powerful machine, which has recently been built for the United States River and Harbor Improvement Company, and which was until recently operating in front of the long dock at the new depot of the New York and Erie Railroad, Jersey City, has given proof of extraordinary efficiency.

On the 9th of October last an experimental test was made of this dredge in presence of a number of engineering and scientific gentlemen, who, by their signature, certify to the following result, viz.: in one hour, eleven scows were filled and dumped alongside. Each scow held 35 cubic yards, making 385 cubic yards, or at the rate of 3850 cubic yards in ten hours. The scows were uniformly filled in five minutes; the buckets came up quite full. The material excavated was a soft clay or mud. The greatest depth this machine will dredge is 23 feet, and the [illegible] 4 feet.

The machine consists of a wrou[illegible] with a succession of buckets across the periphery, and d[illegible]eter by two oscilating engines, placed at right angle[illegible]nd connected directly to the wheel by means of tw[illegible]e engine shafts, and two sets of tooth segments, [illegible]e on each side. The pinions are kept in gear w[illegible], by means of radius bars, connecting the wheel [illegible] engine shafts, so that when the wheel is raised [illegible] shafts, cranks, bushes, etc., are moved backw[illegible]ch described from the

centre of the cylinder trunions. The valve gear is so arranged that the valves operate in whatever position the engine shaft may be on the arch. The wheel is raised or lowered at pleasure by two screws, one on each side, operated by independent engines, and all the movements of raising, lowering, and revolving, as well as feeding ahead, are all under the control of one man on deck. The excavated material is discharged from the buckets by means of a tipper, or movable shoot, which is hingea to the base, or stationary shoot, one end being free to raise and fall as the wheel revolves. A cam, fastened on the rim, immediately ahead of each bucket, lifts the tipper, and allows the full buckets to pass. When it has passed, the tipper, being no longer supported by the bucket, falls, or tips down on the rims of the wheel, striking, in its descent, the protruding end of the latch which holds the trap of the bottom of the bucket, knocking it out, causing the contents of the bucket to be precipitated over the tipper, and through the shoots, with great velocity, into scows on either side of the machine, there being a reversing gate on the apex of the shoots, for throwing the discharge alternately on one side or the other, to prevent delay while changing scows.

The advantages of this plan of dredger over all others are—1st, Its great facility of application; 2d, That, after being lowered, it cuts npward and always against the edge of steel cutting blades, rendering it effective in the hardest strata of earth; 3d, Its continuous feeding by trench cutting; 4th, The strength and simplicity of its parts in detail, and the unity of the combination, permitting the exertion of great powers and consequent extraordinary efficiency, with far less liability of derangement than must necessarily attach to any other known system for dredging. The bucket lids, latches, and tipper, are self-acting and self-adjusting, and work by gravitation alone. This machine also particularly recommends itself for performance of works where specified depths of water are required, as the wheel can be gauged so as to take off precisely the surface necessary to be removed, and leave a smooth and level bottom.

The boat is scow built, length, 105 feet, breadth, 34 feet, depth, 11 feet 6 inches, with a well in the centre to receive the wheel; length, 51 feet, width at the centre, 8 feet, width at ends, 4 feet 9 inches, sides and ends vertical.

Small engines, two in number, oscillating. Diameter of cylinders, 12 inches; stroke, 18 inches; with improved valve gear. Engines placed at right angles.

One boiler, single return flue description. Length, 20 feet; diameter of shell, 7 feet 7 inches. Furnaces, two in number. Length, 6 feet; width, 3 feet 6 inches; height of chimney, 32 feet; diameter of do., 2 feet 9 inches. Bunkers hold 30 tons of coal.

The macnine is anchored by spuds, one at each end of the boat, and when put in operation these are hove up, and two leetimbers lowered, one on each side, which, as the boat goes anead, drag along the bottom, and prevents leeway or turning round by the wind.

The testimonials to the performance of this dredging machine being from practical and scientific men who have witnessed its performance are abundant.

COMMERCE OF THE PORT OF NEW YORK.

The following table shows the number of vessels arrived during the year 1857 from foreign ports, their nations, etc.:

Nation.	*Frigates.*	*Stmr's*	*Ships.*	*Barks.*	*Brigs.*	*Gallit's.*	*Sch'rs.*	*Total.*
American	2	139	747	617	801		496	2,802
British		84	23	65	316		227	715
French	1	1		3	7		4	16
Bremen		1	45	61	14			121
Hamburg		11	28	23	3		1	66
Swedish				4	7			11
Austrian				3	1			4
Norwegian			2	6	5			13
Italian				1	2			3
Danish				2	11		3	16
Russian				3				3
Dutch			1	3	8	2	3	17
Belgian		7	1	1	1			10
Prussian			2	3	2		1	8
Neapolitan				1	4			5
Sardinian					2			2
Genoese				1				1
Mexican				2	1			3
Portuguese				1	12		2	15
Granadian							1	1
Oldenburg				16	7	1	2	26
Spanish		1	1	5	16		1	24
Mecklenburg				5				5
Hanoverien				3			1	4
Brazilian			1	1				2
Chilian				1				1
Venezuelan					[illegible]			2
Sicilian			2	5			1	8
Tuscan				1				1
Equador				1				1
Peruvian			1					1
Dominican				1				1
Totals	3	244	854					3,908

COMPOSITION OF NAVAL BATTERIES.

EXTRACT FROM "SHELLS AND SHELL-GUNS," BY COMMANDER J A. DAHLGREN, U. S. NAVY.

(*Continued from page* 9.)

Shell Guns.—The benefits that were to accrue from the long-sought and so recently attained unity of calibre, seemed doomed, by some fatality, never to be realized in their full extent, at least with the 32-pdr. and 30-pdr.; for just as measures designed to give practical effect to the project were in course of execution, the shell-gun enforced admittance among naval ordnance, and thus marred the uniformity of the unit battery; for the authorities were equally unable to reject it wholly or to adopt it entirely. Two calibres were therefore unavoidable. At first and for some time subsequently the number of shell-guns introduced was very limited—too much so to exert any material influence on the absolute or relative values of the French, English, or United Sates broadsides, but not to escape the habitual tendency to complication, for very soon there were two or more classes of the same calibre to be found in the three services. The French had Nos. 1, 2, and 3, of the 22 cent. The English, the 8-in of 65 cwt. and of 52 cwt. The United States, the 8-in. of 63cwt. and of 55cwt.

The British regulations of 1839 had practically the effect of fixing the minimum of the shell power in their naval batteries; while special orders or regulations made such additions from time to time, in particular ships or classes, that in 1849, only ten years after the date of the general regulation, it appears from official sources that 76 vessels were armed with a greater number of shell-guns than prescribed in 1839. The total force of these ships was nearly 4,000 cannon, of which about 1200 pieces (or 3-10 of the whole) were 8-in shell guns, besides 45 pivot 68-pdrs., or 10-in. shell guns—being about twice the force of the whole U. S. Navy, built or building. In some of the ships the shell-guns in broadside were so numerous as to be constituted into an entire tier. In others they were divided among the several tiers.

In 1853 some simplification of the U. S. Batteries was effected by abolishing the light 8-in. guns and 32-pdrs. of 51 cwt. in the spar-deck battery, and increasing the 8-in. of 63 cwt. on all gun decks, so as to form an entire division there of 10 pieces. This materially improved the power of the ships. In France alone, where originated the leading measures that have so entirely remodelled naval batteries, was there shown any tendency to keep the number of shell guns within very limited bounds. A slight diminution was even effected to make way for a new and very heavy gun

in broadside, (the long 50-pdr. of 10,000 lbs.) which nearly assimilates with the British 56-pdr., in calibre and character.

The execution of this plan does not appear to have been carried out to any extent, not further, it is believed, than a trial of the gun in one or two ships, which is not surprising, considering that it was to be located in broadside, where its power would be cramped by the size of the ports, and the want of a pivot-carriage sensibly experienced. The reasons are not given for this unusual application of a piece whose weight and range, according to the invariable practice of other navies, were exclusively fitted for pivot service. Its peculiar powers of matching the British 56-pdr., or of supplying the obvious deficiency in range of the 22-cent shell gun, were plainly nullified by placing the gun in a port; for it is stated by the commander of the Practice ship *Minerva*, that the muzzle of the 50-pdr. was in contact with the upper sill at 4 3-4°, though the dimensions of the port had been purposely increased. Now the special function of such a piece hardly began until it reached this elevation. It is true that the heel of the ship might add all that was required for the long range, if the gun was to windward, but in firing to leeward the same cause would take away even the limited scope allowed by the port. Its introduction was therefore a disadvantage, under the circumstances, for it displaced an equal number of the 22 cent which, similarly situated, were more convenient of management and of greater power. Placed at the bow or stern on the spar-deck, its superior fire, at long range, would have been unquestioned and useful.

The operation of the several regulations and special orders on the armaments of French, English, and United States ships at different periods, may be perceived by the following summary of the elements of force in the classes that represent the average power in the line-of-battle, and also in that ship of all work, the frigate.

LINE-OF-BATTLE SHIPS.

	No. of Guns.	*Date.*	SHELL GUNS. *8 in. or 22 cent.*	32-POUNDERS. *Long,*	*Medium,*	*or Light.*	
British	92	1839	10	56	26		
"	92	1849	32	34	26	0	Pr. Regent, &c.
"	92	1849	26	42	24	0	Rodney, &c.
French	96	1848	16	24	26	30	
"	90	1849	10	[illegible]	[illegible]		6 50-pdrs.
United States	88	1820	0	32 [illegible] / 34			[illegible]drs. Carr.
" "	88	1841	8				
" "	84	1845	12				
" "	84	1858	20				
Supposed U. S.	84	1845	20				12-pdrs. Carr.

FRIGATES—1ST. CLASS.

	No. of Guns.	Date.	SHELL-GUNS. 8-in or 22 cent.	32-POUNDERS. Long, Med. or Light.			
British	50	1839	4		46		
"	50	1849	12	20	18	0	Vernon.
"	50	1849	28	0	22	0	Euryalus.
French	60	1848	4	26	0	30	
"	50	1849	2	28	18	2 50-pdrs.	
United States	54	1841	4	28	0	22 42-pdrs.	Carr.
" "	50	1845	8	30		12	
" "	50	1853	10	24		16	

LINE-OF-BATTLE SHIPS.

			BROADSIDES.					
			8 In., or 22 Cent.		32-pdrs. w'ght.			
	No of Guns.	Date.	Wght.	Contents of Powder. lbs.	Long.	Med. or Light.		Total.
British	92	1839	255	12½	896	416		1567
"	92	1849	816	40	544	416		1776
"	92	1849	663	32½	672	384		1719
French	96	1848	484	32 4-5	402	958		1824
"	90	1849	303	20½	368	871	167 long 50-pdrs.	1712
United States	88	1820	none		1248	462		1710
" "	88	1841	204	8	1068	462		1734
" "	84	1845	306	12	960	192		1458
" "	84	1853	510	20	768	256		1534
" "	84	1845	510	20	924	420		1854

FRIGATES—1ST. CLASS.

British	50	1839	102	5	736			838
"	50	1849	306	15	320	288		914
"	50	1849	714	35	0	352		1066
French	60	1848	121	5½	436	503		1060
"	50	1849	60	4	469	301	56 long 50-pdrs.	886
United States	54	1841	102	4	448	462		1012
" "	50	1845	204	8	480	192		876
" "	50	1853	255	10	384	256		895

Such are the results arrived at by the naval authorities of the three countries, in regard to the preferable mode of developing the fullest ord-

nance power of the broadside. They concurred in all the primary constituents save one, using a like calibre and its classes, associated with an auxiliary shell-power, of which the French piece alone differed in its development from the English and American. But, how variedly do they combine the several elements? The line-of-battle ships referred to are nearly of like size and capacity. There is a heavier class, the three-deckers, and also a smaller class of their own denomination; but these are the heaviest of the two-deckers, and may be assumed to represent the average strength of the line of the three nations.

By the regulations of 1839, the British total weight of broadside is low, and the power in longer pieces not very full. Both of these imperfections are well rectified in such ships as were affected by the special orders of 1849.

The French 90 and 96 have a full total weight of broadside, but are notably deficient in the power of batteries beyond short distances, by reason of the small number of pieces capable of this effect.

The original United States battery (1820) is well provided with a full total weight of the broadside, and a great power of penetration, range, &c., mainly due to the tier of long 42-pdrs. The introduction of the 8-in. guns, in 1841, detracted nothing from either of these qualities. But the effect of the regulations of 1845 is singularly unfortunate, virtually emasculating the power of the ship in every particular. The order of 1852 remedied this to some extent, but had the 42-pdr. been adopted as the unit, that order would have maintained our heavy two-deckers upon an equality with the heaviest of the English class.

The shell-power in all the ships was originally low, and insufficient to exercise a decided effect upon the general fire of the line. The same may be said of the French broadside, as constituted by order of 1849, while the shell-power of the United States was much improved, and that of the British became quite as respectable, by the orders issued subsequently to the General Regulations, particularly the Prince Regent class, where it is of a predominating character, and makes the battery more powerful than that of any United States or French two-decker.*

In the first class frigates there is also considerable diversity of combination; but the British Euryalus class (of which there are twenty-four ships) is plainly the most powerful, by reason of the great extension of the shell

* It may be noted here, as a means of co ... past date, that the Brittannia, three-decker, on being laid up in ... Trafalgar, in which she bore a part, returned 102 guns to store ... a broadside weight of metal equal to 1160 lbs.

power. It is to be observed that these regulations have reference exclusively to sailing ships, in which the battery is confined to the broadside. But the application of steam to national vessels, imposes the necessity of resorting to a different style of armament. The earliest steamers were driven by the side-wheel, and so continued for many years later. This arrangement conflicted directly with the system of broadside armament, both as regarded the number of guns and their position. In the first place it was impossible to carry the customary proportion of pieces in a vessel of this description, because the steam power occupied so much of the space commonly allotted to stowing provisions and water, that the crew required for a full broadside could not be provided for. Therefore it was necessary to reduce the number of men, and, as a consequence, the number of cannon, independently of which the latter could not be accommodated in the broadside, because the huge wheels and their fixtures not only covered much of its extent, but they interfered with the training of those guns for which there was room. But the disadvantages of the new motor did not end with diminishing seriously the offensive power of the broadside; it also offered a large and vulnerable surface to the numerous cannon of the sailing ship, so that close combat became almost certainly disastrous to the side-wheel steamer. Thus several conditions concurred in determining the style of battery suitable for side-wheel steamers. But few pieces could be mounted and these must concentrate the greatest possible power of offense at ranges where the broadside cannon would be deprived of much of their efficiency. Hence the heavy ordnance of ten and twelve thousand pounds, (56-pdrs., 68 pdrs., &c.) and the pivot system by which they were alone manageable.

The 10 inch shell gun of 84 cwt. appears to have been the first piece of ordnance expressly designed and cast in England for this purpose. (1831) It was carried by the smaller class of steamers first introduced into the British Navy, and subsequently by the larger side-wheel and screw vessels. In 1841 a 56-pdr., by Monk, was made for the Navy, and in 1844 and 1845, more than 50 pieces of the same kind. The 68-pdr., by Dundas, was subjected to experiment in 1841, and in the five years following more than 100 guns of similar description were cast. These two pieces were long, heavy cannon, of 11 and 12,000 pounds, and commonly known as shot guns. The 68-pdr. soon obtained the preference over the 56-pdr., and appears to be adopted at this time as the principal pivot gun of the British Navy.

In addition to the pivot guns necessarily mounted on the spar-deck, the largest steamers had gun-decks, on which were mounted as many broadside pieces as could be carried, but by no means in sufficient numbers to match the armament of a sailing ship of like tonnage.

Some 20 years passed in laborious and costly experiment with the new motor. Its advantages were great in certainty and in speed, but in defiance of every suggestion that experience could furnish, and of every improvement in detail, it seemed utterly irreconcileable with the development of the full ordnance power, and even with the use of sail. If steam were applied, it was to be done to the prejudice of the offensive power and of the less expensive motor—it was the riddle of the day.

The problem was at last solved as it only could be solved—not by perfecting details, for it was not a defect of detail—but by going back to the first principle of propulsion, where the difficulty had its origin. The cumbrous paddle was dispensed with, and for it was substituted the screw. By this means, the broadside and the space between decks were once more free to the guns along the entire length. The action of the screw was in complete harmony with that of the sails; they might be used independently or in connection at pleasure, and thus the restoration of the old and cheap motor made it convenient to reduce the new and costly one to the functions of an auxiliary. Hence a reduction of the size of engine, and its restriction to limits that did not interfere materially with the room needed for the crew that were to man the broadside. And to complete the sum of its advantages, the screw was hidden beneath the water, where, with the engine, it was not more exposed to shot than the magazine.

Thus the propeller ship was not only equal to the sailing ship in every motive and offensive power possessed by the latter, but it had at disposal another means of movement even less vulnerable than masts, sails and yards. The final result, thus accepted, constituted steam as an auxiliary, and the pivot armament experienced a similar change in its character. With the side-wheel it was the chief means of offence; but when the screw was introduced, and with it the broadside was restored, the heavy pivot-guns were retained, though by their comparatively limited numbers they became a subordinate element in the broadside. Thus the British 91 gun ships, *Nile*, *Algiers*, and some of the screw frigates carry a 68-pdr. on the spar-deck. Others, such as the *Simoon* and *Termagant*, carry two of 68 and four of 10 inch, with 12 and 18 long 32 pdrs. in broadside—a powerful armament, though liable to the objection of three calibres among 18 and 24 guns, and by no means developing the power of which the metal is capable.

THE MERRIMAC AND SHANNON.*—The prefere[illegible] ns so clearly manifested by the British authorities in th[illegible] noted in the

* From the Appendix of Commander D[illegible] wor

armament of their ships, appears to be sustained by the results of their experience, if we may judge from the style of armament said to be adopted for one of their finest ships recently built and just put into service, the *Shannon.*

As much interest must necessarily attach to this vessel, we note, in the absence of official data, the following details from the public journals:—

Length between perpendiculars,	235 feet.
Beam, moulded,	49 ft. 6 in.
" extreme,	50 feet.
Depth in the hold,	18 ft. 4 in.
Tonnage, (old English Rule)	2,617 tons.
Armament, 51 guns—main deck,	30 8-in. of 65 cwt.
" spar deck,	20 32-pdrs. of 58 cwt., and 1 68-pdr. of 95 cwt.
Crew,	550
Horse power, (nominal)	600
Cylinder, diameter,	70 inches.
Stroke, length,	42 "
Screw, diameter,	18 feet.
Pitch of screw,	25 "
*[Length of screw.	3½ "
Diameter of screw shaft,	13 inches.
Number of Boilers,	4 pieces.
Number of Furnaces,	20
Diameter of tubes,	2½ inches.
Length of "	6 ft. 4 inches.
Diameter of funnel,	7 ft. 6 "
Revolutions of Engines,	56
Speed of the ship on trial,	11½ knots.

NOTE.—One of the screws has been diminished on the sides of the blades, to enable the engines to get away, and with the following result:—

Revolution of engines,	59½
Speed of ship	11.6 knots.]

The *Shannon* is strictly a frigate—that is, she carries her battery in two tiers, one being uncovered, but in tonnage is equal to a large two-decker, with much more length, equal beam, and less draft. The main force of

* Added to Commander Dahlgren's text for the purpose of showing fuller details of this ship.—EDS. NAUT. MAG.

armament is an entire tier of shell guns, (8-in of 65 cwt.) on the gun deck. On the spar deck are 20 32-pdrs. of 58 cwt., and a long 68-pdr. of 95cwt. on the forecastle. The remarks that have been made in relation to the comparative force of the United States' ship *Merrimac*, and the British ships *Shannon* and *Euryalus*, induce me to offer a few words on the subject.

The batteries of these ships may be stated thus from the best sources that are accessible to us:—

	GUN DECK.	SPAR DECK.
Euryalus,	28 of 8-in. (of 65 cwt), . . .	22 32-pdrs. of 45 cwt.
Shannon,	30 " " " . . .	20 32-pdrs. of 56cwt. and 1 68-pdr. of 95 cwt.
Merrimac,	24 of 9-in., . . .	14 8-in. of 63cwt, and 2 ten-inch, of 107 cwt.

Taking the mean weight of iron that goes out of the guns to any one point, the ships will discharge—*Euryalus*, 1066 lbs.; *Shannon*, 1167 lbs.; *Merrimac*, 1424 lbs.; so that even by this standard, the *Merrimac* would have the superiority in offensive capacity, by a ratio of 100 to 82.

But such a mode of estimating the power of ordnance is only admissable when the description of gun is the same in both ships, or, if different, when the distances are so short that the hastiest shot will neither miss the mark nor fail to perforate. When, as now, it is expected to use the advantages of heavy calibres for superior accuracy and force beyond mere point blank, the amount of metal that issues from the broadside does not supply the criterion of power, *but that which strikes the object and with due force.* Relative accuracy and penetration are therefore to be considered in estimating the value of ship's batteries like those now spoken of.

There is no difficulty in deciding between the *Shannon* and the *Euryalus*, because both have similar calibres, 8-inch on the gun-deck, and 32-pdrs. above. But the *Shannon* has more of the 8-in. shell guns and heavier 32-pdrs. than the *Euryalus*, and hence has unquestionably the more powerful armament, whether far or near, in a ratio somewhat greater than the absolute weight of broadside. Besides which, she has a 68-pdr. on the forecastle.

Now, as regards the *Shannon* and *Merrimac*, the [illegible] 8 inch shells
from the gun-deck of the former are inferior, no[illegible] weight, to
the 864 lbs of 9-inch from the gun deck of the [illegible] n accuracy
and power, so that a distant object w[illegible] str[illegible] that weight,
and with less force. The accuracy [illegible] 8 in [illegible] ing about as
5 to 7, the penetration as 9 to 10. [illegible] cc [illegible] ier as 5 to 6,

with the further advantage to the 9 inch of greater effect, by reason of the superior content of the individual shells, larger orifice and greater shock of impact.

Then on the spar deck we have for the *Merrimac* 360 lbs. of 8 inch shells to oppose the 325 lbs. of shot from the *Shannon*—the accuracy of the 8 inch shells to the 32-pdr. shot being as 5 to 3—the shock and orifice greater, with the addition of the explosive force of 14 lbs. of powder. The *Merrimac* has also two pivot 10 inch to meet the one 68-pdr; that is, 200 lbs. in heavy shells to meet the one 68-pdr. shot, or one 8 inch shell.

It is of course impossible, nor is it necessary, to deduce the *exact* value of the combined results, but we think that a glance at the facts will convince that the *Merrimac* not only has the advantage in absolute weight of projectile, *supposing all strike*, but that the greater accuracy and power beyond point blank will increase this difference very much in favor of the *Merrimac*.

The United States ship has also the capacity to bear more battery than that now carried. Her tonnage is one-fifth greater than that of the *Shannon*, and according to the ratio of armament to burden in the latter ship, (1: 16½) the *Merrimac* should (other things being eqnal) bear with equal ease about 196 tons of ordnance, while, in reality, she only carries 153 tons, which is absolutely seven tons less than the weight of the *Shannon's* guns. The addition would give 10 more 9 inch guns, for which the *Merrimac* has at this time unoccupied ports on the gun deck, and would raise the power of the *Merrimac's* broadside to 1780 lbs.—placing it not only overpoweringly above that of the *Shannon*, but also on an equality with the broadside of the heaviest two-decked line-of-battle-ship in the British or any other Navy.

As for the speed of the *Shannon* or *Euryalus*, if superior, as claimed, to that of the *Merrimack*, the only advantage conferred by it would be to choose the terms on which an action should take place; but the *Merrimack* having the greater ordnance power at any distance, the only privilege to be derived by the other ships from their superior speed, would be to avoid the action altogether, which, as regards the *Shannon*, it is not to be supposed the commander would choose to do. We are inclined, however, to question the greater speed of the *Shannon* under steam, because it is observed that the comparison now referred to is based on 7 knots as the best rate of the *Merrimac*. Now, I happened to be in the ship when she went 8 knots, and have since seen a letter from an officer who states that in steaming from Brest to the Tagus, the rate of going was as high as 9½ knots.

REMARKS.—With regard to the relative speed of the Merrimac and Shannon, Commander Dahlgren's impressions cannot be correct. The London *Artizan* states the speed of the Shannon on trial to be 11½ to 11 6-10ths knots, which we think may be relied on. The splendid ordnance power of the Merrimac will prove of doubtful availability as against such as the Shannon, if she be not able to chase and bring to battle the enemy, or if, having engaged, the latter finds it prudent and has the ability to relinquish the contest. We may always expect an enemy to haul off rather than be defeated. Sea fights are not got up for exhibitions of courage, but every action must have in view the greatest damage to the enemy consistent with self-preservation; and the velocity of the ship is an acknowledged means of offense and security. The "choice of terms on which an action shall take place" is not, therefore, to be despised or undervalued. The possession of this quality is often the only security against a cruiser's defeat. Having it she is enabled to be master of the attack, and can begin and end it at pleasure, capturing equals and inferiors, but avoiding or escaping superiors. If the Merrimac cannot command an engagement on advantageous terms, by reason of her dull steaming qualities, but on the contrary, vessels of inferior power are able to elude her in single combat, she will find battle only on the defensive, and be liable to fall a prey to superior force. Her great ordnance power will prove wholly misplaced under these circumstances. Only in case of battle with a sailing ship could she probably derive any considerable advantage in action from the auxiliary steam power with which she is provided. But these will seldom be met with hereafter as cruisers—their place will be in squadron for obvious reasons. View this question as we may, it is but too evident that the weak point of the Merrimac and consort ships is dull speed under steam; and we cannot help regarding a failure in velocity as defeating the purposes of improvement in ordnance power.

THE subjoined table shows the number of ships on the stocks in the several yards of New-York, and the number of men engaged on them:—

Shipyards.	*Number of Ships*	*Number of Men Employed.*
Roosevelt & Joyce's	1	25
Westervelt'	3	200
Webb's	4	135
Sleers'	—	—
English's	—	—
Colyer's	1	80
	—	—
Total	8	440

WATER-TIGHT COMPARTMENTS IN PASSENGER SHIPS.

NOTWITHSTANDING all that has been published, both in the diurnal and periodical press, upon the necessity and importance of dividing the hold of vessels into water-tight compartments, and notwithstanding that the loss of the *Arctic*, and now the *Central America*, may be directly traced to the absence of water-proof bulkheads, we find that the Marine Surveyors of New York do not accredit a single American steamer with having her hold thus divided. It is doubtless well known that it is upon the Marine Surveyor's reports, the underwriter's base their estimate of the risk to be incurred by them, when issuing policies of insurance; and the amount of premium charged for insurance is made up in accordance with these reports. Now why is it, that the few vessels which have thwartship bulkheads in their holds are not reported on the insurance companies' books? Doubtless it is because they are so constructed, that they would be quite as well, if not better, without, than with such as they have. Any steam vessel is better without transverse *wooden* bulkheads only, than she would be with them, inasmuch as they render the ship more combustible, and cannot be kept water-tight, because of the shrinkage consequent upon the heat of the hold. They prevent free access to the hold, fore and aft, which is an inconvenience, without furnishing that security, which was designed to be more than an equivalent for that inconvenience. The strength and safety of the vessel, against the ordinary dangers of navigation, demand that kind of security, which is furnished only by longitudinal and transverse bulkheads, but let them be, at the same time, proof against flood; and in order to be made water-proof in a steam vessel, they must also be *fire-proof*; there is the same necessity for the one as there is for the other.

The public mind has been misled on the subject of safety, particularly in passenger vessels. It has been assumed that large vessels are the safest for passenger transit, because of their increased size. Now it is plain that large vessels are the most profitable, so long as they are not expanded beyond the practicability of finding freights readily, or a number of passengers corresponding to the accommodations furnished. But this is but one side of the question. A vessel of twice the length, double the breadth, and with an equal proportionate increase of depth, of another, has eight times the capacity. Now the expected gain in the increased size of the vessel, must arise from the proportionately reduced first cost of vessel, the economy of motion and propulsory power, and in manning the ship, and can be accredited no where else.

Let us examine the question in another direction. The small vessel we have taken for our model was, we will assume, 100 feet long, 25 feet wide,

and 12 feet depth of hold. She performed well, was staunch and seaworthy, and had the required strength to maintain her shape at a draught of water commensurate with her constructed line of flotation. We may therefore set her strength down as unit. Now we have expanded her model, as developed in the large vessel, to eight times the capacity, and consequently eight times the strength of the small vessel is required, in order to secure the unit, or the same proportionate amount of strength. But this is not all. The draught of water must not be increased, because with the increase of draught of water we increase the power of the hydraulic action of the ocean wave upon the bottom of the vessel, to successfully resist which, the strength must increase as the draught of the water is increased.

Let us inquire to what extent the strength of the large vessel extends beyond that of the small one, as at present constructed. If the scantling of the frame were doubled, as also the siding size, and the lap, in framing, were double the length, still we should have but little more than double the strength, whereas we require eight times the amount in every part; but it has been discovered that the proportionate strength cannot be obtained without a mixed construction of wood and iron; hence the introduction of the diagonal strapping. Now it is most surprising that shipbuilders, masters and owners, can discover a weakness in the sides of the vessel, which is supported by the shrouds at the several masts, and cannot discover the greater disability in the bottom, upon which the masts and cargo rest, and the bottom, placed at the same time in the most disadvantageous position to carry the unequal burden. If the bottom of one of our ocean steamers were cut off at the base of the bilge, and its strength tested, it would be found that flatwise, as now constructed, was its weakest position, and that, supported from any one point of the bottom surface, it would be ruptured beyond a doubt, by its own weight; but if this same bottom were supported on its edge, at any point, it would be no stretch of the imagination to conceive that it would not only be able to bear its own weight, but that of a very considerable bulk of cargo, without rupture. Now the hydraulic action of the wave upon the bottom has precisely the effect we have named, of transposing the point of support from one part of the bottom, at one instant, to that of another part of the bottom at the next. Added to this, the engine is constantly exerting a churning motion upon the bottom.

We have been at some pains to investigate the extent of thi
and expansion in the bottom of our ships, particularly our
and have seen the ship when light, with the bilge
with transversely a concave bottom, at its gr
timbers being hollow on the line of their mo
vessel we have taken occasion to examine. le

loaded, and found the garboard seam several inches below the lowest part of the bilge. With these facts before us, what must we think of the sea-worthiness of our ocean steamers? If this vibration of the bottom takes place while yet the vessel is new, and when in port, before making a single voyage, what must be the effect of loading and reloading, added to the destroying hand of time, and above all, the hydraulic action of the sea, and the sundering force of the engines upon the bottom? It was a knowledge of the weakness of the bottom of the U. S. Steamer Roanoke that induced her constructor to make an effort to support the bottom by shoring it down from the decks, but to his great surprise both the bottom and decks crushed in like an egg-shell, exhibiting even less intrinsic strength than the egg, which has a shell of sufficient strength to bear its own weight. The ship referred to, had a bottom and decks as strong as other war vessels of the ordinary type of model, but when the time came for transferring the weight of the ship from the numerous distributive points to the cradle, from the stocks to the ways for launching, the constructor well knowing the weakness of the bottom, sought to support it from the decks, by shoring it down, from the beams, directly over the ways. This was equivalent to transferring the entire weight of the ship upon the decks, and had the beams, like the frame of the ship, been made up of a number of lengths, the decks, like the bottom, would have yielded. There would have been no rupture of beams; the flexiformity of shape consequent upon imperfect construction, would have been all that would have been discovered. Every butt in the length of the beam, like those in the bottom, would have been a hinge, while the sides would have been contracted, and the entire fabric, to some exten, would have yielded to the necessities of the occasion, and the launch would have been lauded as a successful feat in naval construction. Hence we discover that in order to render this wicker-basket mode of construction complete, it is only necessary to make the deck-beams, like the framing of the bottom, of several lengths; and to make the frames of vessels heavier and the planking lighter, and we shall have succeeded in making our floating fabrics a winding sheet to the confiding passengers and crew.

The marine architect should not be unmindful that *small vessels are the safest, because the strongest;* and this is the reason why the passenger will leave the large steam or sailing ship in the open sea, in the fiercest gale; because there is no dread of rupture without collision; the strength is proportionate to the capacity, and to the service required. When there is confidence that this is the case, the passengers are anxious to exchange the largest vessel, which they have proved to be unseaworthy, for the open boat, which had been regarded as an unnecessary encumbrance.

It must be plain, that in order to make our large vessels equally s

as those of smaller size, we must give the large ship as much more strength than the smaller as she has more capacity. In the example already shown, the large vessel had eight times the capacity of the small one. Now it is a plain, common sense truth, that the large ship cannot be furnished with eight times the strength, in the two sides, one bottom, and two decks. The small vessel has as many sides and as many bottoms as the large one, and if eight of these small vessels were brought together, we should see the philosophy of the whole matter; we should see what was required, viz.: that the hold of the large ship, which has the capacity of eight small ones, should be divided into compartments, each containing one eighth of the whole capacity. Who does not see that by carrying this arrangement into the hold, the largest ships may be made sea-worthy? First make the longitudinal rigidity sufficient to sustain the ship upon a sea midships, with a ruptured compartment at each end, full of water; then divide the hold into compartments by transverse bulkheads, allowing these to extend several feet above the load line of flotation, and we shall not find the marine register silent upon the sufficiency and sea-worthiness of our steamships for passenger transit, as they now are.

WOOD AND METAL USED IN THE CONSTRUCTION OF THE U. S. STEAM FRIGATE NIAGARA.

The following materials, exclusive of armament and machinery, were used in the construction of the frigate Niagara:

Live Oak timber, cubic feet, ...	40,000
White Oak " "	10,000
White Oak plank, superficial feet, . .	11,000
Yellow pine timber, cubic feet, . . .	42,000
Yellow pine plank, superficial feet, . .	60,000
White pine timber, cubic feet, . .	3,000
White pine plank, superficial feet,	42,000
Iron, in pounds, . .	350,000
Copper, " .	140,000
Spikes, ...	20,000

LENGTHENING OF THE SCREW STEAMSHIP CANDIA.

We find in the London *Artizan*, (which, by the way, is rather better authority on marine engineering than naval architecture,) the following account of the lengthening of the screw steamship *Candia*, the performances of which were noticed in a former volume of the NAUTICAL MAGAZINE. The *Artizan* gives two accounts of the results obtained on the trial trip at the measured mile, one by a correspondent, and the other editorial. They differ in several items of data, and at this distance from "Stoke's Bay," it is impossible for us to decide positively which account is correct. We shall take the fullest, therefore, and make some remarks upon the results and the inference drawn by the *Artizan* therefrom, as explanatory of the doctrine of fluid resistance.

SOUTHAMPTON, Aug. 24th, 1857.

The Peninsular and Oriental steamship *Candia* sailed from hence on the 15th Inst., for Calcutta, *via* the Cape of Good Hope. She ha 169 passengers, chiefly military officers returning to India.

This vessel was built by Messrs. Mare, in 1853-4. Her engines are by Messrs. Rennie, and are highly creditable specimens of the geared class of engines.

When on the Alexandria station, and engaged in transport service, during the late war, the *Candia* was celebrated for her rapid voyages, but it being thought desirable to increase her accommodation for passengers and cargo, Mr. John Laird, of Birkenhead, received instructions to prepare a section of the length which it was determined should be added to the vessel.

She was accordingly placed in the graving dock, and moulds made of her exact form, and the disposition of the plates at the part intended to be cut; this having been carefully done, she was free to run on her station until the new length was ready, when she was sent to Birkenhead, and placed in one of the new graving docks which Mr. Laird has lately added to his extensive establishment.

The separation was made nearly amidships, in the space between the engines and boilers, and was effected by lifting the decks, cutting out the rivets in the plates, stringers, sleepers, and keel, and launching one end away from the other on a cradle, to the distance of 33 ft. 3 in. The new section, all ready, was then erected in this space, and, the measurements having been taken very accurate, all the new frames and plates fitted their places exactly, the outline of the form and sheer of the vessel being admirably preserved. The additional length given, of course, necessitated

additional longitudinal *strength*, and all the cabins and decks were stripped for the introduction of deep iron stringers and waterway plates, running the whole length fore and aft, besides diagonal truss plates rivetted on the top side of deck beams. The engineers of the ship had the boilers to shift aft to their former relative position to the engines, so as to bring in all their steam and feed-pipes, etc.

The time actually occupied in the whole work enumerated, inculding the restoration of the cabins, etc., was about five months, a great part of which was in rainy weather, and we think great energy was displayed in gettting through so much work in the time.

The *Candia* is now a noble looking ship, and much improved by the alterations she has undergone, by which she now carries 30 first-class additional passengers, stows 120 tons more coal, and 240 tons more cargo than before, and we have no doubt will average a higher speed at sea, because a long vessel is less affected from *pitching* than a short one.

Her dimensions are now :—

	Ft.	In.
Length between perpendiculars	314	6
Ditto over all	346	8
Breadth of beam	40	6
Depth of hold	26	0

Her engines are 450 nominal H. P., and are similar to those fitted by Messrs. Rennie to the Peninsular and Oriental Company's steamship *Pera*, whose excellent performances we noticed in the March number of the year 1857. They stand fore and aft, and are vertical single trunk, geared engines. There are four boilers, fitted with Messrs. Lamb and Summer's patent flues.

The effective diameter of cylinders	70¾ in.
Stroke of piston	4 ft.
Multiple of gear	2 to 1

The trials of the *Candia* at the measured mile, in Stoke's Bay, we will now proceed to notice, the first having [illegible] the second trial *after* the alterations we have des[illegible] to our readers some very valuable data on the [illegible]ately been discussed in the *Artizan*, viz.: the tru[illegible] in steam navigation.

It will be noticed that the propell[illegible]nd trial was not the same as that used on the first [illegible]as caused by the two-bladed screw, first employed, [illegible]tally broken whilst docking the vessel in Lond[illegible]mmencement in the

transport service, when the present three-bladed propeller was fitted. Apropos of the question of two and three-bladed screws, we believe that almost all the screw fleet of the Peninsular and Oriental Company are now fitted with *three*-bladed propellers, which they have found give at least *as good* a result in smooth water, but certainly a *higher* speed at sea than those with two blades. The former also cause less vibration at the stern of the vessel, and in a heavy sea allow the engines to *race* less than the latter.

Trials of Candia, at measured mile, in Stoke's Bay.

	1st Trial.	2d Trial.
Date of trial	May 31, 1854.	Aug. 12, 1857.
	Ft. In.	Ft. In.
Draught of water forward	18 6	18 2
Ditto aft	18 6	19 5
Ditto mean	18 6	18 9½
	Tons.	Tons.
Weight of coal, water, etc., on board	583	884
Displacement of vessel	2 436	3 034
	Sq. ft.	Sq. ft.
Immersed midship section of vessel	527	542
Mean revolutions of engines per minute	36½	33
Ditto screw ditto	73	66
Description of propeller	2-bladed	3-bladed
	Ft. In.	Ft. In.
Diameter of ditto	15 6	15 6
Pitch of ditto	20 0	21 0
Gross indicated H. P. of engines (mean of four runs)	1.672	1.462
Speed of vessel in knots per hour ditto	12·651	12·443
Ditto in statute miles ditto	14·654	14·413
Slip of screw in knots per hour	1·75	1·22
Ditto per cent	12	9
Coefficiens of immersed midship section, or speed in knots per hour, cubed × immersed midship section ÷ indicated H. P	636	713
Coefficient of displacement, or speed in knots per hour, cubed × cube root of the square of displacement ÷ indicated H. P	218	275
Advantage obtained by the additional length of vessel per cent., taking immersed midship section as the element of resistance	—	Per cent. 10·8
Ditto ditto from the coefficient of displacement	—	20·7

In the above article the following points are to be noted: *First.* On the first trial, May, 1854, the pitch of screw was very fine—too fine for efficiency, being only 4½ feet greater than the diameter. The *Candria* should have run above 14 knots on this first trial, and the pitch of screw

alone prevented it. On the second trial, we find her propelled by a *three-bladed* screw of the same diameter, but with *one foot more pitch*, and consequently propelling a larger ship at nearly the same rate of speed with one quarter less *slip*.

Second. Owing to the employment of a different screw (three-bladed, with more pitch,) the experiment, which, at first sight, appears to be for the determination of principles ruling the velocities of ships, formed with short and long midship bodies, or the influence of small and large displacement upon speed, with the same, or nearly the same area of midship section, is entirely perverted, and is more like an experiment to test the efficiency *of the screws.* The three-bladed screw is admitted by the writer to be superior at sea for speed, and one foot more pitch added material improvement, as shown by the less slip on trial; but with this improvement the increase of resistance from enlarging the displacement, was still too great to permit the engines to bring the ship quite up to her original measure of speed.

The *Artizan* says: "We doubt not, had the boilers been new, and indicated the same power, her speed would have been equal, and even greater than on the last occasion; thus showing that it is not merely the displacement that must be taken into account in comparing vessels, but also its disposition." Nor should it be forgotten that on the last trial, if the boilers were old, the engines had also been in use some time, and no doubt worked more smoothly than when first up; under the circumstances we are inclined to the opinion that at least equal power was actually exerted. In fact the *Artizan* states that "during the [late] trial, they [the engines] worked quite as well, if not better, than on the occasion of her first trial, about three years since."

Third. The alteration in the *trim* of the ship materially modified the model, easing the lines of the bow, and filling out those of the stern.

According to our views of modelling, this change was an improvement, and if we had the lines of the vessel, an effort might be made to demonstrate it.

The most that is shown by this experiment is, that the addition of the 33½ feet in length amidships could be made to the *Candia* without materially impairing her speed, with the same boilers and engines, provided a *better screw and improved trim of the ship should be adopted.* This result might have been expected, under such conditions. Let no one [illegible]
data like the above, that the *Candia* might [illegible] with
33 feet, and the added displacement wo[illegible] e
of speed. The model is one of the ma[illegible] n
determine the performance of a ship, [illegible] he
ignored with any amount of argum[illegible] an

Candia had sailed with a more favorable trim, and been propelled by a better screw, on her first trial, three years ago, perhaps it might have become more apparent what precise amount of retarding influence was exerted by the addition of several hundred tons to the original displacement.

OUR PINE FORESTS.

The following, from the *Washington Union*, is worthy of notice, not because there is the least cause of alarm in reference to the scarcity of timber for shipbuilding, but on the contrary, to admonish those who are ignorant of the abundant supply of other kinds of timber which invites the axe of the woodman to its proper use.

The Yellow Pine Forest of the South.—The rapid disappearance of the pine forest, under the axe of the planter and timber-getter of the southern States, known as the *yellow pine* among shipbuilders, is beginning to attract the attention of the public.

This belt of forest runs east and south of a line drawn from the Chesapeake Bay through Raleigh, in North Carolina; Cheraw and Columbia in South Carolina; Augusta, Macon, and Columbus, in Georgia; Montgomery, in Alabama. This line may be said to be the base of the Blue Ridge.

From this base line stretching to the seaboard, over a level or gently undulating country, but occasionally interspersed with oak and hickory, lies this great pine belt.

Its width, save that tongue jutting into Florida, may be estimated from seventy-five to one hundred and fifty miles, but on that portion touching the Atlantic and Gulf coasts, a width of from thirty to forty miles, the pines are scattering and of stinted growth, and almost worthless for commerce, save for turpentine; so that it may be safely estimated that, that portion of the pine belt adapted for the cutting of timber cannot exceed an average of more than seventy-five miles in width, and of this probably near one-half of the forest, since the first settlement of the country, has been deadened, and the soil put in cultivation.

It is well known that the stronger and better the soil, the larger, longer, and straighter the pines, and thousands of acres of these pine forests are annually deadened by the planters, for the purpose of putting fresh land into cultivation, while the timber-getters are culling and cutting for commerce that which is within a convenient distance for water carriage. Nor

will the planter desist from this wholesale destruction of these forests until the value of the trees shall be so enhanced as to make it an object for him to hold them for their value as lumber.

Thus will the forest continue rapidly to disappear, until it will be found, perhaps too late, that there is a scarcity of this valuable timber, and which, if ever replaced, will require centuries.

For more than a quarter of a century, the United States government has been guarding and protecting the live oaks that grow within a limited distance of the seaboard, and yet it is a well-established fact that the live-oaks are of a much more rapid growth than the yellow pine.

It has been estimated by the timber-getters that a large pine sufficient for the spars or beams of a first-class ship requires from two to three hundred years to grow.

The pine forest of Virginia, and North Carolina, which is within a convenient hauling distance to water carriage, is already nearly exhausted.

In Georgia, that which is on the principal rivers has been culled for some miles on either side of the streams, and timber is now being hauled from ten to fifteen miles to the Savannah river for shipment.

The French government, at the present time, is having its orders for timber filled by trees cut in Georgia, upon the rivers that flow into the Gulf of Mexico, and here the rafting of timber for miles across the open bays to the points where the shipping can come to receive it, renders it exceedingly troublesome and expensive, and often attended with the entire loss of the rafts.

With a knowledge of these facts, and doubtless startled by the rapid destruction of these pine forests, our government has acted wisely in withdrawing from sale (now for the first time) her pine lands which lie upon the Suwannee river, in Florida, with the view of holding them for their lumber, for the future use of her navy; and it may now be seen—and perhaps too late—that this wise precaution should have been taken years ago, by withdrawing those pine lands in Florida which are situated upon the waters that flow into the Atlantic.

We have long protested against destroying timber by making staves and heading of the bodies of our white oaks, and against girdling whole forests of ship-timber, for the purpose of making log heaps for the devouring flame. But for the legitimate purposes of commerce, the [illegible] United States are, and will continue to be, for the next hundred years [illegible] country. One of the chief difficulties lies in the want of a [illegible] of the various kinds of timber adapted to shipbuilding. [illegible] of absurdity to suppose that live-oak, white oak, and [illegible] the only

kinds of timber fit for shipbuilding. Rock maple makes a better keel than white oak; elm is better thon white oak for bottom plank; red beech and yellow birch is equally as good for bottom plank as white oak. Black walnut and hackmatack make decidedly a better frame than white oak. Spruce and sweet gum make excellent shiptimber; so does Chestnut. White ash makes good top timbers. White pine is by far the best for deck plank, except for war vessels. Chestnut or sweet gum is as good for beams as yellow pine, and black cypress is both strong and durable.

Yellow Cypress is better for bulwarks of war vessels than yellow pine; white pine and spruce make the best spars, topmasts excepted. The hemlock of the East makes good spars and top timbers. In fact there is the greatest variety of ship-timber in this country, and nothing but ignorance of the American forest growth, keeps us within the narrow circle of oak and pine. Some of those kinds of timber we have named are more durable than white oak or yellow pine. For strength and durability, the locust is far better than live oak, and the growth much more rapid. The yellow pine is not as slow in maturing for ship-timber as the editors of the *Union* have stated, nor is the live oak so quick in its growth; it has a more tardy growth than yellow pine, in some localities.

For the Nautical Magazine.

STEAMER INDEPENDENCE.

Particulars of the Steamer Independence.

Hull built by Samuel Sneden; machinery by the Morgan Iron Works, New York; Superintending Engineer, Erastus W. Smith.

HULL.

	Ft.	In.
Length on deck, from fore part of stem to after part of sternpost	140	
Breadth of Beam, (moulded,)	26	
" " " over planking	26	6
" " " over guards	47	
Depth of hold, spar deck	10	3
Floor timbers at throats, moulded		14
Sided		10 & 12
Distance between centres		24

Frames braced with diagonal iron bars, $3\frac{1}{2}$ and 9 1-16 in., one to each frame, cross-laid and riveted at their crossings.

Draught of water in running trim	6ft. 9 in.
Contents of bunkers, in tons of coal	30 tons.
Tonnage, Custom House	400 "

ENGINES.

Two in number, "vertical beam" description.

	Ft.	In.
Diameter of Cylinders		32
Length of stroke	8	
(cut-off variable, from one-quarter to full stroke.)		
Maximum pressure of steam above the atmosphere, in pounds	30	
Revolutions per minute	25	

PADDLE WHEELS.

	Ft.	In.
Diameter	24	
Length of paddles	7	6
Depth of "	1	8
Dip of "	2	10
Number in each wheel	20	
Material of wheels	Oak	
Outside rims of iron......2	3½ by 9-16 in.	

BOILERS.

In number, two. "Single return flue leg description.

	Ft.	In.
Length of boilers	18	
Breadth " ....front	7	6
" " ....back end	7	6
Number of furnaces in each boiler	2.	
Breadth	3	2
Length of grate bars	6	6
Height of steam chimneys	9	
Internal diameter "	3	
External diameter of chimneys	5	2
Diameter of smoke-pipe	4	4
Height of smoke-pipe	28	
Description of coal	bitum	
Draught		

REMARKS.—The *Independence* is built by Capt. E ... rk, for towing in the harbor of Valparaiso, S. A. ... ith round stern; has high, close bulwarks all ro ... ard and aft, a forecastle deck, and half wheel g ... , and has no incumbrance on deck, except the p ... wheel houses. The planking of the bottom, b ... oak, three inches thick, square fastened with c ... . Ceiling is of four inch yellow pine. Deck b ... , ten by

twelve inches, six feet between centres, with lodger bosom, and hanging knees of hackmatack at each beam. Deck plank are of white pine, three inches thick. All subordinate parts are in proportion. Engines are connected by a centre shaft fitted with a connecting crank, which admits of their being worked separately or together.

Connected with the boilers is a large-sized independent "Worthington's" steam fire and bilge pump, of a capacity of 800 gallons per minute, supplied with four branches of hose connections, and hose for extinguishing fire, and is to be used in Valparaiso as a floating steam fire engine. The vessel is also supplied with large iron tanks for fresh water, which, by the aid of the steam pump, will be supplied to vessels.

For the Nautical Magazine.

OUR NAVAL CONSTRUCTORS.

Much has been said in favor of building our vessels of war by contract, in private yards. Without any wish to disparage those who have covered the seas with the American clipper, something should be said in defence of our naval constructors, who, as a body, are well versed in all the mysteries of shipbuilding, and some have no superiors in the country.

Why should not the head of the Navy Department call on every constructor in the Navy to submit models and plans for the construction of some of the proposed steam sloops, and thus show how they would compare with those of the mercantile constructor. If I am not misinformed, at the time the late Mr. Upshur presided over the Navy Department, each constructor was called on for a model for one of the sloops then building; and resulted in the production of the *Portsmouth*, *Plymouth*, *Jamestown*, *Germantown*, etc., at that date confessedly the finest vessels of their class in the world. The *Portsmouth*, though frequently in company with our finest clippers, has, I believe, never been beaten.

The *Jamestown*, when loaned to the merchants of Boston, to carry provisions to the starving millions of Ireland, under the command of Capt. R. B. Forbes, proved herself the fastest vessel that had at that time crossed the Atlantic, and the report of Capt. Forbes, as to her sailing qualities, created quite a sensation among the Boston shipbuilders, and was the primary cause of the *sudden* and decided change in the models of vessels, that produced the present American clipper. In fact, she was the first clipper having the principal elements, viz.: increased length, long floor, and sharp ends. The models of *all* the new steam frigates, except the *Niagara*, are the work of the present Chief of the Bureau of Construction. Not one of

the constructors were consulted; no Board was called together, that advantage might be taken of their knowledge and practical experience. Every thing was marked out for the building constructor, even to the minutest detail. In these ships no improvements are perceptible over the old frigates. There we see the old-fashioned, and now exploded lightning-conductors and capstan. Modern improvements in this respect were all rejected. Brown's capstan and stoppers, so admirably adapted for giving increased facilities in getting under way, are not to be found.

The *Niagara* has been called a failure, with some show of truth, on account of her internal arrangements, and want of room for fighting her stern chase guns. But that she will carry the battery for which she was designed, and perform as well as her constructor promised, there can hardly remain a doubt, after reading of her performance, with 1000 tons of the telegraph cable on board, when she distanced the *Agamemnon* and *Susquehanna*. But are not the Chief of the Bureau's vessels also failures? Do they carry the Battery designed for them, and will they carry it without giving such a draught of water as will exclude them from most of our principal ports?

Let it then be fairly tried. The *Niagara* has returned from England now; let her be fittted in all respects with the battery she was designed for, a full supply of stores, provisions, etc., and the *Wabash*, confessedly the best of the Chief's vessels, fitted in like manner. Let them cruise together long enough to experience all vicissitudes of weather—the story will then be told as to which is the superior vessel. The frigates *Santee* and *Sabine*, after remaining on the stocks some thirty years, were launched about three years since, and are now rotting at the yards where they were launched. They were altered before launching, after designs by the constructors of the yards, by increasing their length, making them sharper forward; through the influence of some of the *young fogies* in the Navy, (contrary, it is said, to the wishes of the Chief.) The Navy looked with eagerness to see the effect of these alterations on their speed, etc.; but I fear, like the *Ohio*, they will remain for years at their moorings, until some new Chief fits them for sea, or the Secretary, throwing aside the trammels of the red tape system, orders them out. The *Franklin* ship of the line, rebuilding as a steamer, for the last five years, after designs by a Board of Naval Constructors, has not yet made her appearance, and I am fearful will not, unless the Secretary interferes. Let these vessels [illegible] their proper place in the Navy, and we can then form some idea wha[illegible] Navy Constructors can do. Let them stand or fall by their own [illegible], but give them an opportunity of showing the good that is in them.

A Chief of Bureau mistakes his position when he descends to [illegible]m- a shipbuilder, and forces, by the aid of his position, his n[illegible]

Navy. His is a more elevated position: he is there to produce the fastest and most efficient vessels the country can build, with all the modern improvements that can aid in developing their efficiency. It will not do to say, that a more efficient vessel than the old frigate of 1812 cannot be produced; to do this, he must look farther than the walls of his own office, or the cogitations of his own brain. Let him call upon the talent under his control for their models and views; hold out inducements for the best talent in the country to compete for the palm of superiority, and not arrogate to himself the possession of all nautical knowlege, in the building, rigging, equipping, and manning our vessels of war, for I doubt if ever he was at sea in a vessel of war. Are we not getting our vessels of war too large? Few of them can enter our southern ports. In the event of a difficulty with any of the great maratime powers, how are we prepared for the defence of the weakest points of our extended sea-coast?—the coast of the slaveholding States? Would not an enemy seek to attack us there, create insurrection, and by the aid of their light draught steamers throw in supplies and munitions of war? What have we to defend them? where find vessels of sufficiently light draught that will carry a proper armament? We must build steamers for home protection as well as for the protection of our commerce in distant seas.

Gentlemen of the South, look to it, for here *you* are interested. The *Niagara* was built to test guns of a heavy calibre. Let us have one of the sloops built to test the theory of light draught for the defence of our bays and shallow waters. Even if she should not turn out all that is desired, we should gain by the practical knowledge thus obtained. Now that the government are anxious to stop all fillibustering expeditions, where are the vessels to do it? We have no light draught steamers, except the *Fulton*, and she cannot be in all places at the same time. The large steamers, from their heavy draught, are unfit for such work. Let a fleet of the light draught mercantile steamers leave the mouths of the Mississippi or the ports in the Gulf; by keeping in the shoal water along the coast, they could defy all the steamers in the Navy to stop or impede their progress.

A. B. C.

NOTES.—Mr. Rhoades, who designed and built the *Jamestown*, was a private builder prior to his appointment as Naval Constructor.—[ED.

The above communication was received shortly after the issue of our Sept. number, which will doubtless account for the writer's silence upon the subject of the ten vessels of light draught of water recommended to Congress in the President's Message, and Report of the Hon. Secretary of the Navy.—ED.

RUSSIAN TABLES OF THE STRENGTH OF HEMP ROPE AND IRON CHAIN.

It is well known that Russian hemp rope receives the character of superiority for strength while Russian iron is undoubtedly among the strongest in Europe. The following tables are the first sanctioned by imperial authority, and now for the first time translated into English for the Nautical Magazine and Naval Journal. They are taken from an excellent Russian book which treats of "*Rigging Ships of War*," by Captain K. Passiet, of the Imperial Navy.

A TABLE SHOWING THE STRENGTH OF FOUR STRAND COMMON ROPE OF RUSSIAN HEMP.

Size in inches.	*No. of Yarns.*	*Weight of 100 sagins* in poods.*	*Breaking Strain in Poods.*† *Greatest Strain Applied.*	*Medium Strain Applied.*		*Least St ain Applied.*	*Av'age Strength in Poods.*
8	768	44.36	1442	1394	1313	1192	1328
7½	672	40 12	1275	1240	1175	1075	1191
7	582	31.24	1164	1159	1125	1045	1123
6½	506	27.32	936	800	764	650	787
6	428	22.24	729	725	708	700	715
5½	361	19.24	711	706	693	511	655
5	299	16.24	659	621	615	572	647
4½	238	12.36	514	510	475	435	483
4	191	10.36	464	460	450	435	452
3½	145	7.32	325	325	313	275	309
3	108	5.28	221	213	213	200	212
2½	79	4.12	189	175	164	160	172
2	47	2 24	100	100	100	98	99
1½	30	1.28	63	62	62	50	58

* One sagin in length is equal to 0.778 [illegible] uently 100 sagins is equal to 77.8 yards, or 38.9 fathoms.

† One Pood, in weight, is equal to [illegible] make about one English ton gross.

A TABLE SHOWING THE STRENGTH OF THREE STRAND CABLE LAID ROPE OF RUSSIAN HEMP.

Size in Inches.	No. of Yarns.	Weight of 100 sagins in Poods.	Breaking Strain in Poods. Greatest Strain Applied.	Medium Strain Applied.						Least Strain Applied.	Middle Average of Strength.	Average of Least Strength by calculation.
26	3528	389.5	7556							6540	6900	6275
25½	3393	374.6	7264							6300	6634	6034
25	3267	360.7	6986	6615	6584	6306	6275	6121	6121	6069	6380	5799
24½	3122	344.8	7073							5836	6337	5480
24	3006	331.6	7156							5626	6300	5343
23½	2880	318.0	7233							5416	6263	5125
23	2763	305.1	7314							5206	6226	4909
22½	2646	292.1	7388	6770	6288	6151	6121	5966	5812	5008	6188	4699
22	2529	279.2	6887							4816	5873	4483
21½	2412	266.3	6399							4631	5570	4291
21	2304	254.4	5923							4451	5274	4093
20½	2196	242.5	5459							4278	4983	3901
20	2088	230.5	5008	4852	4835	4822	4760	4668	4587	4109	4705	3709
19½	1980	218.6	4742							3849	4408	3530
19	1881	207.6	44[illegible]8							3510	4117	3351
18½	1782	196.7	4241							3326	3839	3178
18	1692	186.8	4000							3079	3569	3005
17½	1597	176.3	3771	3690	3382	3369	3215	3091	3042	2844	3301	2844
17	1512	166.9	3542							2776	3153	2683
16½	1422	157.0	3342							2708	3011	2522
16	1332	147.0	3122							2646	2872	2374
15½	1251	138.1	2924							2590	2739	2226
15	1179	130.1	2732	2658	2640	2627	2597	2578	2566	2535	2615	2083
14½	1098	121.2	2574							2369	2467	1947
14	1026	113.2	2417							2226	2327	1818
13½	954	105.6	2269							2077	2189	1688
13	882	97.3	2127							1935	2059	1564
12½	810	89.4	1991	1991	1978	1978	1931	1931	1916	1805	1937	1447
12	756	83.4	1842							1644	1768	1335
11½	693	76.5	1706							1496	1614	1224
11	630	69.3	1576							1348	1465	1119
10½	576	63.6	1447							1212	1323	1020
10	522	57.6	1329	1298	1219	1094	1094			1083	1187	927
9½	468	51.6	1175							971	1057	835
9	432	47.7	1032							865	937	748
8½	396	43.7	903							767	828	668
8	315	34.7	779							674	723	593
7½	288	31.8	661	649	649	637	637	637	618	587	631	519
7	252	27.8	557							508	544	431
6½	216	23.6	501							432	464	389

6	189	20.8	433							358	389	332
5½	162	17.6	364							296	329	278
5	135	14.9	309	308	284	260	247	247	247	241	216	229
4½	108	11.9	247							192	210	185
4	90	9.9	198							154	171	133
3½	69	7.6	148							117	129	111
3	54	5.9	111							87	93	81

A TABLE SHOWING THE STRENGTH OF THREE STRAND COMMON ROPE OF RUSSIAN HEMP.

Circumference in Inches.	No. of Yarns.	Weight of 100 sagins in poods.	Breaking Strain in Poods. Greatest Strain Applied.	Medium Strain Applied.		Minim'm Strain Applied.	Av'age Strength in Poods.
12	1173	81.1	2813	2504	2411	2161	2473
11½	1077	"	2578			1976	2269
11	987	"	2362			1812	2077
10½	900	"	2158			1651	1898
10	816	58.9	1960			1496	1725
9½	738	"	1768			1348	1578
9	660	47.2	1589			1212	1397
8½	591	"	1422			1082	1249
8	522	38	1261			958	1113
7½	459	"	1113			841	977
7	399	"	977			729	853
6½	345	"	847			631	742
6	294	22.9	726	665	618	538	637
5½	249	19 6	606			451	538
5	204	19.6	507		433	377	445
4½	168	11.4	414		309	309	365
4	132	"	328			247	290
3½	102	"	253			198	229
3	75	5.6	192		155	148	172
2½	54	"	136			111	129
2	33	"	93		105	80	86
1¾	27	"	79.6	79.6	76.2	69.9	76.2
1½	21	"	55.6	55	54.4	53.2	
1¼	15	"	37	34.6	34	[illegible]	
1	12	"	36.8	31.5	30	[illegible]	
¾	9	"	31.5	28.4	28.4		
½	6	"	17.8	17.8	17.2		

(*To be continued.*)

NEW YORK HARBOR ENCROACHMENTS.

It is worthy of remark that there is no harbor on the American continent which has equal facilities for the accommodation of maratime fleets with that of New York. It is also but too plainly manifest that there is a disposition on the part of our Legislature to foster, rather than to prevent speculative projects, set on foot under the guise of improving its condition, but which, in fact, have no other interest to serve, than such as properly belong to individual gain.

The natural boundary of the waters forming the harbor of New York, if left to be delineated by the tidal force of its confluent rivers, would ever unmistakably point to the proper locality for legislative action. From the time when New York began to assume an importance among the commercial marts of the world, there has been a disposition but too manifest, to encroach upon the waters of its bay and rivers; and when, by the visible effect of the protuberating obstructions of several hundred feet, at Corlear's Hook, beyond the chartered line of limitation, and on the opposite side of the river, near the Navy Yard, of a similar encroachment, and still farther, in that notorious obstruction, (and subsequently attempted swindle upon the city treasury,) in the Lober bulkhead, which has completely changed the tidal force along the western shore, with other similar obstructions at Gowanus Bay, and on the Hudson River—it was deemed absolutely necessary that State legislation should interpose, to secure its commercial advantages to posterity. While the subject was pending, and the grievances accumulating, as if to add insult to injury, another project was devised to fill the coffers of a designing few. It was proposed to enlarge the Battery, a time-honored locality since the days of our beloved Washington—a spot so endeared by revolutionary reminiscences to every American patriot, could not fail to meet the warm, sympathizing responses of every heart—more especially when it was proposed to beautify it, and at the same time improve the condition of the harbor, an important qualification. The bargain was consummated, and that, without the least investigation in reference to the effect upon the tidal force, at the confluence of the two rivers, both of which it was but too plain, was to be effected in some way by the change in the margin-line to be delineated by the enlargement. While this obstruction was in progress, the log-rolling for a harbor commission had been completed, and a commission was appointed whose capacity for this purpose was too insignificant to command the respect of the merchants of New York, but whose audacity was competent to maintain the preponderance of favoritism, and save these protuberating obstructions from removal, some of which belonged to members of the commission. In order to

show some fruit of their labors, they prevailed upon the general government to grant them the assistance of Prof. Bache and other distinguished members of the Coast Survey; and although they failed to secure the recommendation of an exterior boundary line, by these gentlemen, in exact conformity with their own views of propriety, which would, perhaps, have more fully screened their own reprisals "for the public good," they managed to take care of their own interest, supposing, doubtless, it was that for which they were appointed, while they inflicted a serious injury to the riparian owners on the two rivers. While the harbor commission iniquity is yet fresh in the minds of the citizens of New York, the battery enlargement is suspended, for the time being, securities for its completion being, it is said, worthless. Since its commencement, the hush of interest has kept the fact from the public, that the mouth of the East River has gradually shoaled, and now, at the commencement of 1858, Diamond Reef is made the depository of the sediment which formerly took the place of the enlargement. The Engineer to the Board of Underwriters has made some investigations in reference to the silt deposited in the harbor from the sewers of the city; this, although of sufficient importance to secure the attention of the city authorities, in view of its prevention, is, however, of minor importance, when compared with the fraudulent obstructions which have been winked at by the Harbor Commissioners of 1854. It is a law of tidal currents to deposit the silt held in solution by its waters upon the shoaler portions of its adjacent waters.

COMMERCE OF THE UNITED STATES.

The following will show the exports to foreign parts, from all the ports of the United States, of breadstuffs and provisions, and the total shipments of cotton, both in quantity and value, with the average value of the latter per pound:

Year ending June 30.	Breadstuffs and Provisions.	Cotton. Pounds.	Value.	Av. price, cents.
1857	$74,667,852	1,048,282475	131,575859	12.55

The number of bales of cotton shipped was, 2,265,588, against 2,99[illegible] for the preceding year, and 2,303,403 for the year 1854–5. Th[illegible] averages higher than for any preceding year since 1839. T[illegible] creased the total value of the shipments, although the quantity last year. A very instructive comparison of the difference to

of a change in the export price is shown in the relative quantity and value shipped last year, and the year ending June 30th, 1855. The quantity is very nearly the same in both cases, but the value has gained over thirty-three million dollars.

The quantity and value of the tobacco exported is also shown. Previous to 1855, the quantity was all reckoned in hogsheads.

Year ending June 30.	Bales.	Cases,	Hogsheads.	Value.
1857	14,482	5,681	156,848	20,662,772

The following will show the exports of rice from the United States to foreign ports, with the average price per tierce:

Year ending June 30.	Barrels.	Tierces.	Value.	Av. price per tierce.
1857	74,309	64,332	$2,290,400	$24.85

Up to the year 1854, the exports of rice were all reckoned into tierces, being chiefly shipped in that measure. During the last two years more has been sent out in barrels, but the value is given only in the aggregate.

The growth of our trade with the Canadas and other British Possessions in North America, since the Reciprocity Treaty went into effect, is shown in the following table:

Year ending June 30.	Exports. Foreign.	Domestic.	Total.	*Imports.*
1857	$4,326.369	$19,936,113	$24,262,482	$22,124,296

[*N. Y. Jour. of Com.*

THE LEVIATHAN.

This vessel, it would seem, was being built by English capitalists, without the least regard to utility or cost. The inceptive principles developed in her construction have been discussed in the September number; they have no basis for profitable investment in commercial science, nor are they more admissable in the science of natural philosophy. But if the design and construction is a departure from the principles, which form the basis of accumulative commercial wealth, the launch has furnished a demonstration of the long forbearance of the shareholders; even when that forbearance ceases to be a virtue. Have Englishmen forgotten that a Newton ever lived, and gave demonstrative lessons in the laws of gravitation to the world? that they should tamely submit to the mortifying spectacle of witnessing a reputed engineer ignoring the laws of gravity, and by "main strength and stupidity," endeavoring to launch a monster ship, weighing

some 1000 tons, on ways made of iron, with a cradle shod with the same material, and the inclination of those ways at most but one in ten; and at a point where the facilities are diminished for the application of power, even there, the inclination reduced to one in twelve. Shame on the shareholders, on English mechanics—on all concerned—to withhold their universal protest against such stupidity, even though exercised by the son of the famous Brunel, of "Thames Tunnel" memory. Had the proper preparation been made for this launch, there would have been no occasion for the use of the hydraulic ram, nor for the river purchases to keep up the motion, when once obtained. The launch of this vesel, if indeed she is yet afloat, has cost a sum sufficient to build two ocean steamers, capable of crossing the Atlantic within a week, carrying a fair proportion of express freight, the mails, and 150 first class passengers in each; the vessel to be proof against the dire calamities of fire and flood, which so often send a thrill of horror to the desolated hearth-stones of our friends. And in order to test the strength of our convictions upon this point, we will announce our willingness to enter into bonds for the performance of a contract containing the above stipulation.

OCEAN CALAMITIES.

To the Editor of the Nautical Magazine:

Dear Sir.—The late terrible calamity, involving the loss of so many valuable lives, and so much property, calls for the united voice of journalists, and especially of those who devote their pages to nautical subjects, in order to ascertain the true causes of the disaster, as well as to point out means for the preservation of life under similar circumstances.

Looking from an unprejudiced point of view, and having a great regard for the memory of the gallant Herndon, I cannot bring my mind to believe that his ship perished solely from the dangers of the sea—there must have been something wrong in her general arrangements, and particularly in her pumps. You have fully discussed water-tight or partially water-tight bulkheads, *without which I do not consider any steamship sea-worthy.* I have, as you know, written much on this subject, and on the subject of *organization* for sudden emergencies, and respecting safe modes of lowing boats in a sea-way, also on the subject of making use of the bu properties of empty boilers for the purpose of keeping a sinking shi a little longer. I have said and have written much on the subject boats, rockets, and mortars for throwing lines. My only reward,

is a feeling that public attention has been somewhat awakened to the subject; shipbuilders and owners begin to think that good ships may spring a leak, and may take fire, and may be run down, and they begin to build ships to meet these every day casualties; but they do not go far enough, and they never will until the law obliges them to provide more efficient means for the protection of life at sea. Nothing could be devised more unsafe than the usual mode of lowering boats by the usual tackles. I beg to refer you to a former number of your MAGAZINE, and to the pamphlet herewith sent, for some hints on these matters.

I have come pretty much to the conclusion, that cork, in some form or another, is the only reliable "life-preserver," and that, without some degree of coolness, great physical power, and courage, few persons can live many hours at sea with the best "life preserver."

Still, we must not ignore them, for the reason that they sometimes fail, any more than we should reject a bulkhead, in a wooden ship, for the reason that it cannot be quite tight.

Among the many devices for saving life in a sinking ship, the most useful and practical are—Bendan's Collopling Boat, Buchanan's Canvas Float, (which is capable of transporting troops, and even field guns, across streams,) Tewksbury's Fold-up Boat, or Float, Jackson's Floating Saloon, my state-room doors, with metallic air pannels attached, Thompson's Seat, Haskells' Metallic Air Canes, Carter's Life Buoy, and a host of others too numerous to mention. The great mistake made in the case of the *Central America*, and the vessels which hailed her, was in not getting a communication by hawser between them. This might have been accomplished, if in no other way, certainly by a "Curtis Rocket," or by a "Manby's Mortar," or even by paying out a long line and buoy, before the vessels came to hail and pass the steamer.

Every steamer, among other appliances, should have rockets, and a small mortar for throwing a line. Several cases within my experience have occurred, where they would have done great service, both in the case of stranded ships, and of ships in distress at sea. Everybody knows that a boat full of passengers, in a moderate sea-way, is an unsafe vehicle, unless controlled and kept head to the sea by a rope, or otherwise. Two men will do more, hauling a boat back and forth, in a sea, than ten can by oars, and do it much more speedily and safely. I trust that what I say may do some good, sooner or later, and am,

Very truly yours,

R. B. FORBES.

We beg leave to differ with Capt. Forbes; iron bulkheads, in wooden vessels, can be made perfectly water-tight.—ED.

THE VELOCIMETRE.

AMONG the appliances for saving life and property, in the nautical world, the Velocimetre is not the least useful—and the wonder with us is, that ship-owners and masters are so slow to appreciate its importance, and that the Underwriters have not insisted upon its use as a qualification necessary to take out a policy of insurance, against the dangers of the sea. Indeed, there are a number of nautical improvements, which should at once be introduced on ship-board, and the Insurance company that would insist upon their introduction, could well afford to take marine risks at a lower premium, with the absolute certainty of being able to declare larger dividends. The kind of Velocimetre described and illustrated in this joural, is beginning to speak for itself. Having regulated it, we know something of its utility, and are glad also to know that the owners of the steamer *Moses Taylor* have adopted it, and that the Navy Department has given an order for its insertion on board the U. S. Steamer *Niagara*, while the gratuitous response, in the following abstract of a letter received from one who has had an opportunity of testing it at sea, will serve a better purpose to the nautical fraternity, than any panegyric from us:

BANGOR, Maine, January, 1858.

SIR.—Permit me to inform you of the qualificanions of your valuable invention, for giving the speed and leeway of vessels. I have had one of your instruments on board of my vessel for several months. I have tested it fully to my satisfaction, and I am happy to inform you, that it meets what has been so long needed on ship-board. In my opinion, it is what nature had designed, in the saving of life and property. I have run my vessel for our eastern iron-bound shores, in thick and stormy weather, by it, and in every case have found it *correct*. I can find my true position at sea, by dead reckoning kept by it. I consider it invaluable, in aiding the making of short passages, by heaving out and taking in sail; the hands on the dial will show the true pressure of canvass the vessel will bear, to obtain her fastest speed.

I also find, in lying at anchor on our eastern rivers, where there are currents, that the hand will watch, and give the drag of the vessel, quicker than the watch on deck can possibly do. Captains and [illegible]rs of vessels in this section have examined it, and its adoption [illegible] immediately sought for, and nothing will be left undone, in rec[illegible]ng their universal adoption.

Yours, Resp[illegible]

[illegible]ENTWORTH.

To the Agent of the Marine
Velocimetre Company.

For the U. S. Nautical Magazine.

THE FIRST TRIP OF THE NEW STEAMSHIP MOSES TAYLOR

The public mind having, in a manner, become somewhat engaged, and deeply interested in the trial, and consequent success or failure of the new and useful inventions placed on the *Moses Taylor*, as the first of our Ocean Steamers, a brief description of her trip may not be wholly uninteresting.

At twelve minutes past two o'clock, P. M., on Tuesday, January 5, the *Moses Taylor*, John McGowan, Commander, bound for Aspinwall, left her pier, foot of Warren street, amid the waving of hats and hands, and cheers of the multitude assembled to witness her departure. She swept down the bay in gallant style, receiving and exchanging salutes as she passed the various vessels in the harbor, made Sandy Hook at 3.40, discharged pilot, and at 3. 55 her bold and intrepid commander, whom

> No fears can e'er appal, nor doubts, nor dread,
> Though ocean storms should rack old Neptune's bed,

struck fearlessly out into the trackless ocean, as direct a course as possible for Aspinwall, the seat *in transitu* of the rich commerce between the young golden State of the West and her sister confederates of the North and East. Day after day did the angry seas and heavy swells wrestle with the noble ship, and day after day she gallantly swept along, parting the angry waves with giant pride, and " walking the waters like a thing of life."

The new, and hitherto untried Sickles and Dickerson "cut-off" attached to the engines, worked admirably, and gave universal satisfaction, as was truthfully predicted by its earnest and eloquent inventors. Regularly as the beating of the human heart, was the rise and fall of its valves and pistons, almost as noiselessly as the limpid blood flows through the veins of the human system, did the steam pass and repass, as designed, through the various channels of its mechanism, as

> Its iron arms and veins of steel
> Give motion to its floated wheel,

and the Titanic sea-god, spurning the angry waves, and daring the strife of winds and tide, ploughed on,

> O'er coral reefs, where mermaids sing,
> Of grottoed caves beyond imagining.

But the *chef d'ouvre* of all on board the ship, and that which attracted the attention of passengers daily and hourly, and elicited from each and every one a general and universal admiration, was the instrument known as the Marine Velocimetre, placed on board by Mr. L. D. Towsley, a gen-

tleman connected with the invention, which is truthfully claimed to give additional security to life, and a protective guarantee of safety to our Naval and mercantile marine.

An instrument so constructed and arranged, as to unerringly indicate the true speed of a vessel, together with its leeway, and faithfully register the same, by means of dials and hands placed in the cabin, seems to partake more of the ideal than the actual—more of romance than reality. And yet this *ne plus ultra* of nautical inventions has been reached—this hitherto mysterious enigma has been solved, and the problem unmistakingly demonstrated, that the true speed and distance a vessel is making, or has made, can be unerringly indicated and registered.

The general adoption of such an invaluable invention, on board our steamships, is desirabie—in fact, we may say *demanded* by the travelling public. With such an instrument on board, the tired traveller may retire at night, and,

> "Wrapping the drapery of the couch around him,
> Lie down to pleasant dreams,

teeling that he is indeed comparatively safe, and that the noble vessel will not, ere the gray dawn, be ruthlessly driven on some rock-bound coast.

The silent finger of that instrument unerringly tells the captain at what point and at what time to look for danger. If sun be obscured, and the stars shut out from his earnest gaze, that monitor is still there, *truthful* and *reliable*. The travelling public cannot award too much praise to the sagacity and enterprise of Marshall O. Roberts, Esq., by whose advice the U. S. M. Steamship Company have adopted the above-described new and useful inventions, and we confidently predict the prosperity and success of the Company under its present management, as the travelling public will generally sustain all appliances, at whatever cost, that have for their object the saving of life and property in commercial pursuits.

At 11 o'clock, P. M., Wednesday, Jan. 13th, the *Moses Taylor* quietly lay at anchor, at her pier at Aspinwall, making the trip in eight days and nine hours, which, considering the rough weather and heavy seas encountered during her voyage, may be set down as unrivalled.

On Tuesday, Jan. 19, at 3.20 P. M., she swung from her pier, in Aspinwall, and with her golden treas[illegible] of wealth, from the lovely Pacific, and with her still rich[illegible] hearts and souls, anxiously counting the hours th[illegible] happy homes and loving hearts, set out on her ho[illegible] harmoniously as the terestrial bodies rove in th[illegible] speed of thought, the accuracy of the pendul[illegible] "beating heart and giant tread, sped the go[illegible] ourse.

As unerringly as the magnetic needle points to the pole, just so truthfully does the finger of the Velocimetre tell her speed and distance On, past Cuba, the "gem of the Antilles,"

Of Castile's power thou now art all,
To tell of Spain's rise, pride, and fall;
And o'er e'en this our Northern Eagle gloats,
And fain would fillibuster freedom down their throats;
Still on, where white-winged courser brings
Its Argosies from every clime,
And on the Empire City's breast,
Pours out the wealth of every clime.

At 7 o'clock P. M. Wednesday, January 27, the *Moses Taylor* reached her pier, making her return passage in eight days and four hours, fully equalling the expectations of her most sanguine friends.

THE STEAMER ADELAIDE.

THIS vessel was built in 1853, by Messrs. Lupton and McDermot, under the immediate supervision and direction of Mr. William W. Vanderbilt, to run on the Sacramento River, Cal.; but the company, by an Act of Consolidation, having no use for her, she was subsequently sold to the Calais Steamboat Company, to run between Boston *via* Portland, Eastport, and St. John's, N. B., where she has been running since, under the direction and agency of Mr. William Goodwin, Lincoln Wharf, Boston. We publish the lines of this vessel, with other particulars, because of her being regarded as a favorite, a position to which she is justly entitled.

DIMENSIONS.

	Ft.
Length on deck	250
" on keel	235
Breadth of beam	33
Depth of hold	9 10-12
Registered tonnage	750 tons.

Size of frame, moulded 16 in. at keel, 9 in. at the bilge, and 5 in. at the deck height. Sided 6 in. on floors, 5½ in. at second futtock. Top timber 5 in., of oak below, except at ends, hackmatack and chestnut above water. Outside plank of white-oak above the load line. Wales and waist of yellow pine. On the flat of bottom, 3. in. Do. at bilge, 3½ in. Wales, 4 in. Waist, 3 in. Strings. 4 in. Clamps, 6 in. amidships, 4 in. at the ends. 8 bilge streaks, 6 in. amidships, 4 in. at the ends, of yellow pine. Keelsons, white pine, cased with yellow pine, centre keelson of oak, 14 × 16 in., beams, 6 × 6 in. Wheel, crank, hatch, and gangway beams, 15 × 12 in., and 12 × 10 in., and 10 × 8 in.

Deck plank, 3 in. over hull, and $2\frac{1}{2}$ in. on the guards. Stem extends to promenade deck. Has a pump windlass and capstan on the forward main deck.

Fastenings—frame bolts, 3-4 inch. Keelson bolts, 1 in. metal and iron, and 2 in each frame, to each keelson.

Bilge-streaks, with one bolt to each timber in each strake, 3-4 inch. Clamps bolted with two screw bolts to each timber, in each streak. Outside plank fastenings, one tree nail 1 1-8 in. and one spike to each streak throughout, the tree nails through and wedge, outside and in.

Centre keelson bolted with 7-8 in. in every timber. Deadwood bolts 7-8 metal and 1 in. iron.

Engine by Neptune Iron Works. Cylinder, 50 inch, 12 feet stroke; wheel 32 feet; diameter, $8\frac{1}{2}$ feet face; depth of paddle, 26 inches.; revolutions, 22, with 33 pounds of steam; cut off at half stroke. Best speed, 8 nautical miles.

STEAMSHIP DISASTERS.

The heart sickens at the appalling loss of life in connection with the loss of our Ocean Steamers. The loss of life on the *Central America* has no parallel in the annals of American steamship navigation. The nearest approach is that in the loss of the *Arctic*, in September, 1854, by which a number about equal to three hundred and fifty human beings met with an untimely end, because the hold of the *Arctic* was not divided into water-tight compartments. The steamship *San Francisco* became unmanageable, in the Atlantic, and foundered, in December, 1853, causing a loss of life differing but little from two hundred souls. The principal cause of the loss of this vessel was the misplacing the engines, boilers, and coal bunkers, by which the ship was unavoidably brought several feet by the head, and went to sea in that condition. The *San Francisco* was, in some respects, one of the finest steamers that ever left the port of New York. She had great longitudinal strength, and but for the want of lifting power in her model, by the rise of her fore foot, and that *fatal* trim of two to three feet by the head, she was lost. We might be [illegible] [illegible] very steamship disaster to its legitimate cause, [illegible] make the proper investigation; but *alas*, too often for the [illegible] the domestic bereavement demands the hush of [illegible] [illegible]d community; and we are compelled to place the [illegible] in the same category. A committee was [illegible] circumstances attending the loss of this vessel [illegible] vicinity encountered and survived the same [illegible]

was regarded by the underwriters as unseaworthy, so much so, that no insurance could be effected on her. The report of this committee furnished abundant evidence of superficiality, whether from interest or incompetency, the public are left to judge, from the character of the men composing it; but certain it is, that the whole matter has proved a farce; the engineer, against whom the passengers were so loud in their denunciation, has been allowed to pass the Board of Examiners, and most likely will be promoted to the command of the engines of a larger vessel. If we take a retrospective view of the various catastrophes, which have befallen our ocean steamships, in connection with those trading with the United States, we find that the following have been entirely lost. We regret that we are unable to place in the same list, the exact number of lives which have been sacrificed in connection with the loss of these vessels:

PRESIDENT.—Never heard from.

COLUMBIA.—Got on shore, and broke in two, for want of longitudinal strength.

HUMBOLDT.—Went ashore, and to pieces, because of her defective model, and longitudinal weakness.

CITY OF GLASGOW.—Never heard from.

CITY OF PHILADELPAIA.—Went ashore, and to pieces, being ill-shapen, and weak.

FRANKLIN.—Went ashore for want of the improvements in aiding navigation, and to pieces, from weakness.

SAN FRANCISCO.—Foundered in the Atlantic, as above stated.

ARCTIC.—Collided and foundered, for want of compartments.

PACIFIC.—Never heard from.

TEMPEST.— " " "

CENTRAL AMERICA.—Foundered; "no blame attached."

The *Independence*, *Tennessee*, *St. Louis*, *Yankee Blade*, and *Winfield Scott*, together with other vessels, afford sufficient material for an instructive volume, to ship-owners, masters, builders, and to the families of those who have found a winding-sheet beneath the dark blue wave.

The voicings of at least *seventeen hundred* souls come up to us from an ocean grave, in unmistakable language, calling upon legislators, both of the General and State governments, to enact such laws, as shall make our passenger vessels *at least as sea-worthy as the tiny boat*, which has not been regarded as too insignificant for legislative action. The voice of lamentation over one shipwreck, by which hundreds of human lives have been sacrificed to the shrine of ignorance and mammon, has not subsided, before another breaks upon our ears.

NOTICES TO MARINERS.

LIGHT-HOUSE AT THE MOUTH OF UMPQUA RIVER, OREGON TERRITORY.—Notice is hereby given, that on and after the 10th of October next, a light will be exhibited in the light-house recently erected on the South Sands at the mouth of Umpqua River. The light is a fixed white light of the third order of Fresnel, and elevated 100 feet above mean sea level, and should be seen from the deck of any sea-going vessel in clear weather, 15 nautical or 17½ statute miles. The structure consists of a keeper's dwelling of stone, with a tower of brick white-washed rising above it, and surmounted by an iron lantern painted red—the entire height being 92 feet.

The latitude, longitude, and magnetic variation of the light, as given by the Coast Survey, are:

Latitude, 43° 40′ 20″ N.
Longitude, 124° 11′ 05″ W.
Magnetic Variation, 18° 55′ E. (July, 1851.)

By order of the Light-House Board.

San Francisco, Cal., Sept. 22, 1857.

IRISH SEA, EAST COAST OF IRELAND—LIGHT-SHIP OFF THE BLACKWATER BANK.—Official information has been received at this office, that the Port of Dublin Corporation has given notice, that on or about the first week in October, a light-vessel will be placed off the north end of the Blackwater Bank in the Irish Sea.

The vessel will exhibit two white lights—one revolving, the other fixed. The revolving light, which will attain its greatest brilliancy once in every minute, will be shown from the mainmast of the vessel, at the height of 39 feet above the surface of the sea. The fixed light will be shown from the foremast of the vessel, at a height of 26 feet above the same level.

The iluminating apparatus will be catoptric, or by metallic reflectors, and of the third order. The revolving light should be visible from the deck of a ship in ordinary weather at a distance of about 10 miles.

The light-vessel will be painted black with a white band, having the word BLACKWATER on her side. She will have three masts, and carry a ball at the fore and main mast heads. She will be moored in a depth of 19 fathoms at low water, at about 1½ mile E. ¾ S. of the Black Buoy on the north end of the Blackwater Bank, in latitude 52° 29½′ N., long. 6° 7′ west of Greenwich, nearly.

A gong will be sounded in foggy weather.

[*All bearings magnetic. Var.* 25° 10′ *West in* 1857.]

By order of the Light-House Board.

Washington, D. C., Oct. 5, 1857.

MEDITERRANEAN, COAST OF SPAIN—FIXED LIGHT, WITH FLASHES, ON CAPE OROPESA.—Official information has been received at this office, that the Minister of Marine at Madrid has given notice, that on and after the first day of April, 1857, a light would be exhibited from a light-tower recently built on Cape Oropesa, in the province of Castellon, Valencia.

The light is a *fixed white light*, varied by a flash once every three minutes. The illuminating apparatus is catadioptric of the third order. The light is placed at an elevation of 75 English feet above the level of the sea, and should be visible from the deck of a ship in ordinary weather at a distance [illegible] miles.

The light-tower stands in lat. [illegible] long. 0° 9′ 7″ East of Greenwich. Its form, height, and color, are not [illegible]

[*All bearings are* [illegible] 18° 45′ *in January*, 1857.]

By [illegible] -House Board.

Washington, D. C., October 5, [illegible]

GREAT BELT, DENMARK [illegible] ALAND.—Official information has been received at this office, that [illegible] at Copenhagen has given notice, that in the month of September, of [illegible] lights will be exhibited at Taars, at the north-west end of Laaland, [illegible] Belt, for the guidance of vessels up to the ferry at that place.

The lights will be fixed white lights. The illuminating apparatus catoptric, or by reflectors of the sixth order. One of the lights will be placed on the shore upon a wooden crane painted white, at a height of 32 feet above the level of the sea, visible from the deck of a ship, in clear weather, at a distance of eight nautical miles, and will be seen all round the horizon. It will stand in lat. 54° 52′¾ N., long. 11° 2′¼ East of Greenwich.

The other will be fixed on a white painted mast at the head of the quay, near the ferry, 663 yards W. 7° N., or W. ¾ N. of the former, at a height of 18 feet above the level of the sea, and should be visible in the direction of the passage for a distance of 5 nautical miles.

By keeping these two lights in one on an E. S. bearing, nearly, vessels may pass through the passage up to the ferry.

[*All bearings magnetic. Var.* 16°½ *W. in* 1857.]

By order of the Light-House Board.

Washington, D. C., Oct. 5, 1857.

Atlantic Ocean, Coast of Portugal—Fixed Light on Cape Mondego.—Official information has been received at this office, that the Minister of Marine at Lisbon has given notice, that on and after the first day of August, 1857, a light will be exhibited from the light-house recently erected on Cape Mondego, at the entrance to Figueira, on the coast of Portugal.

The light will be a fixed bright light, placed at an elevation of 300 feet above the mean level of the sea, and should be visible from the deck of a ship in clear weather at a distance of 20 miles, from S.S.W. round westerly to N.N.E.

The character and order of the illuminating apparatus, and the form, color, and height of the light-tower, are not stated.

The light-house stands near the southern extremity of the cape, in latitude 40° 11′ N., longitude 8° 55′ west from Greenwich.

Observations.—Mariners coming from the north should not steer from the southward of S.S.W. until they round the cape, if bound to Figueira.

The coast between Cape Mondego and Aveiro is more dangerous than it is generally understood to be: at some distance from the sandy beach, banks of sand form at intervals, caused by the influence of the winds or the currents, and disperse and form again at other points along that coast, on which vessels in fine weather have grounded.

There is a good anchorage for vessels on the south side of Cape Mondego, with the wind from the north to east, opposite to the fishing town of Buarcos.

[*All bearings are magnetic. Var.* 22° 15′ *in January,* 1857.]

By order of the Light-House Board.

Washington, D. C., October 5, 1857.

England, South Coast—Owers Light-Vessel.—Official information has been received at this office, that the Corporation of the Trinity House of London have issued the following notices:

In the first week of August, the Owers light-vessel, which lies off the east end of the shoals near Selsea Bill, to the eastward of Portsmouth, was removed about one mile S.S.W. ½ W. of her former position, and into a depth of 19 fathoms at low water of Spring tides, and now lies with the following marks:—The east end of a clump of trees in line with Pagham Church, N. ¼ E.: Eastborough Head beacon buoy, N.N.E. ¾ E.; Mixon beacon, N.N.W.; Elbow of the Owers, N.N.W., distant ¾ of a mile.

Red Buoy on the Varne Sand.—A large spiral buoy, colored *red*, and surmounted by a staff and ball, has been placed in 12 fathoms at low water spring tides on the north-west side of the Varne Sand, off Folkestone, and to the westward of the shoalest water, (9 feet) with the following marks and bearings, viz: Dover Castle N.N.E., distant 9¼ miles; Dungeness light-house W. ¾ N., distant 14 miles.

Masters of vessels, pilots, and others, are hereby cautioned not to cross the Varne Sand on either side of the north-eastward or south-westward of the above named buoy.

White Buoy off Dover Pier End.—A white spiral buoy, with the words "Admiralty Pier Works" marked thereon in black letters, and fitted with a fog-bell, has been placed 80 yards in a S.E. direction from the outer edge of the staging of the works of the pier now in course of construction at Dover.

The pier now extends 300 yards off shore in a S. by E. direction from Cheeseman Head;

and as the work advances, the blue light at its extremity will be moved outwards, and the buoy kept about 80 yards in advance of the staging.

[*All bearings are magnetic. Var. in 1857 off the Owers, 21° 45′ W.; off Dover, 20° 55′ W.; decreasing 6′ annually.*]

By order of the Light-House Board.

Washington, D. C., October 5, 1857.

Atlantic Ocean, South America—Floating Lights in the Rio De La Plata.—Official information has been received at this office, that the Captain of the Port at Buenos Ayres has given notice, that the following lights have recently been established in the Rio de la Plata:

1. A light-vessel off Point Indio, carrying a fixed white light at a height of about 30 feet above the level of the sea, visible from the deck of a ship at a distance of from 8 to 10 miles in clear weather.

The vessel lies in 3¼ fathoms water, N.E. ¼ N. of Point Indio, at about 8 miles from the land, near the edge of the bank or shelf that extends to that distance off shore, and at about 9 miles S.S.W of the tail or southeastern extremity of the Ortiz bank, in lat. 35° 11½′ S., long. 57° 1′ W. of Greenwich.

2. A light-vessel off the north end of the Chico Bank, showing a fixed white light, visible from 8 to 10 miles in clear weather. The vessel lies in 5 fathoms water, N.E ¾ N., 13 miles from Point Atalaya, and about 33 miles N.W. ½ W. from the before named Point of Indio light-vessel, in lat. 34° 46′ S., long. 57° 28′ W.

3. A fixed white light is shown from the hulk or guard-ship, that lies in the Outer Road at Buenos Ayres, in 2½ fathoms water, at about 3½ miles E.N.E. of the city, and 40 miles W. ½ N. from the above named Chico light-vessel. It may be seen 7 miles in clear weather.

Further notice has been given, that a light-vessel is shortly to be placed off the north spit of the English bank, at a distance of 11 miles S. by E. from Flores revolving-light; also a light on the south point of Lobos Island, off Maldonado, near the north entrance of the river Plata.

It is further proposed to place a refuge raft on the English bank.

[*All bearings are magnetic. Var. 11° E. at Buenos Ayres, and 9° 50′ at Monte Viedo, in January*, 1857.]

By order of the Light-House Board.

Washington, D. C., October 5, 1857.

Indian Ocean, Bay of Bengal—Light-Ship at the Entrance of the Mutlah.—Official information has been received at this office, that the Superintendent of Marine at Calcutta has given notice, that a light-ship has been temporarily stationed at the entrance of the Mutlah Channel, in the Bay of Bengal, in latitude 21° 6′ N., longitude 88° 48′ east, nearly, in 10 fathoms depth of water, at about 7 miles southeast of the Outer or Bulcherry reef buoy.

The vessel will exhibit a clear white light, at an elevation of about 30 feet above the level of the sea, which should be visible from the deck of a ship, in the ordinary state of the weather, at a distance of about 7 miles.

The vessel will carry a red flag at the main mast head by day, and, if she continues in her position, will fire a rocket at 8 P. M. [illegible] at 4 A. M., from the 15th March until the 16th October. For the pr[illegible] the light.

Houses of Refuge.—Similar [illegible] houses of refuge for shipwrecked mariners cast ashore o[illegible] bunds have been put up as follows:

No. 1.—*Painted Red.* Just [illegible] Grove, on Seyers' Point, forming the eastern entrance to Ch[illegible] nsive plain, covered with short grass, inside or to the eastward [illegible] re line the shore.

No. 2.—*Painted White.* At [illegible] termookey Channel, 400 yards to the northward of the [illegible] and, and 200 yards from high-water mark. It is in the [illegible]

No. 3.—*Painted Black.* A [illegible] Channel, 400 yards to the north of the point that fo[illegible] ey Channel, and 200 yards from high-water mark.

No. 4. *Painted White.* O[illegible] the eastern entrance

of the Mutlah River, on a sandy patch, about 5 feet above high-water mark, and about 100 feet in shore, distinguishable by a white flag from a long spar and bamboo, which have been put up close alongside of the house, visible above the surrounding trees.

No. 5. *Painted White.* On Bangadoonee Island, about 7 miles eastward of No. 4. It stands on the southeastern part of the Island, above a small sandy beach, about 100 feet from high-water mark. A long spar and bamboo, with a flag, have been put up alongside, and may be seen considerably above the trees.

In each house there is a supply of water and biscuit, a catamaran and paddles, a letter of instructions, and a chart of the Sunderbunds.

Persons cast away reaching land to the east of Saugor, should make search for the houses of refuge; and it should be borne in mind, that when a vessel is lost with a pilot on board, the fact would soon become known at the pilot station and in Calcutta. Parties, therefore, finding their way to the houses should remain there, and husband the means of subsistence, in the assurance that succor will speedily reach them; or, if compelled to leave, endeavor to get westward to Saugor Island, and travel along the beach until they arrive at the light-house; or, make their way to a large fishing village, situated on the southeast side of Saugor Island, using the catamaran as far as practicable.

By order of the Light-House Board.

Washington, D. C., October 5, 1857.

British Isles—Variation of the Compass.—The Hydrographer to the British Admiralty has published the following information respecting the variation of the compass in the British islands and adjacent seas, in order: 1st. To apprise mariners of the decrease of the variation, which in the last 20 years has amounted to one-quarter of a point, and at present averages 6 minutes annually. 2dly. To enable mariners, chart-makers, and agents for the sale of charts, to correct the numerous charts and sailing directions now in use; all of which have the variation incorrectly marked.

From Shetland, the Orkneys, and Hebrides, to the northern coasts of France, between Calais and Ushant, the present general direction of the lines of equal variation is S. S. W. and N. N. E., (true,) ranging in amount from 21° to 28° westerly.

EASTERN COAST.

At Lerwick and Sumburgh Head	25 ° W.	At Flamborough Head	22¾° W.
Pentland and Moray Firths	25¼° "	The Wash and Dudgeon	22 ° "
Buchanness and Fifeness	24½° "	Leman and Ower, Yarmouth and Orfordness	21¾° "
Holy and Farn Islands	24 ° "	River Thames	21½° "
Shields, Sunderland, and Hartlepool	23½° "		

SOUTHERN COASTS.

At North and South Forelands and Dungeness	21 ° W.	At Start Point	23 ° W.
Beechy Head	21½° "	Lizard Point	23¾° "
St. Catherine's, Isle of Wight	22 ° "	Scilly Islands	24½° "
Bill of Portland	22½° "	Cork Harbor	26 ° "
		Cape Clear	26½° "

WESTERN COASTS.

At Valentia and the Blasquets	27½° W.	At Innistrahul Light-house	27 ° W.
Arran Islands	27½ "	Skerryvore Light-house	27½° "
Achil Head	28 ° "	Bara Head	27¾° "
Tory Island	27½° "	Butt of Lewis	28 ° "

NORTHERN COASTS.

At the Minch and Little Minch	27½° W.	At North Ronaldsha, Orkneys	25¾° W.
Cape Wrath	27 ° "	Foula Island, Shetland	25¾° "
Thurso	26 ° "	Unst Island, Shetland	25 ° "

IRISH SEA AND BRISTOL CHANNEL.

At Mull of Cantire	26¼° W.	At Dublin	25¾° W.
Mull of Galloway	25½° "	Smalls Light-house	24¾° "
Isle of Man	25 ° "	Tuskar Light-house	25¼° "
Liverpool	24 ° "	Lundy Island	24 ° "
Holyhead	24¾° "	Bristol	23 ° "

NORTHERN COAST OF FRANCE.

At Calais	20¾° W.	At Jersey	21¾° "
Havre	21 ° "	Casquets, Alderney, and Guernsey	22¼° "
Cape Barfleur	21¾° "	Ushant	23 ° "

Republished by order of the Light-house Board.

NORTH SEA—EAST COAST OF ENGLAND—STANDFORD LIGHT-VESSEL—OFF LOWESTOFT.—Official information has been received at this office, that the Corporation of the Trinity House of London have issued the following notices:

In consequence of the north end of Newcome Sound having grown up, the Stanford light vessel off Lowestof has been moved nearly a cable's length to the E. S. E. of her former position, into six fathoms at low water springs, and now forms a fair-way or channel light. The vessel lies with two remarkably high chimneys at Lowestoft nearly in line N. W. by W., East Newcome buoy just open to the eastward of the N. E. Newcome S. S. W. ¾ W.

Also, the north end of the Scroby Sound off Caistor having grown out to the westward, the north Scroby buoy has been moved about a cable's length to the westward of its former position, and now lies in 5 fathoms at low water of spring tides, with the following marks and bearings, viz.: Caiston Mill in line with the Beachmen's lookout, S. W. ¾ W. Cockle light-vessel, N.W. by N. Middle Scroby buoy, S. by W. ½ W.

BRAN SAND LIGHTS, RIVER TEES.—In consequence of an alteration in the direction of the channel at the entrance of the river Tees, it has become necessary to move both the Bran Sand lights about 300 fathoms to the eastward, and since the 10th July, 1857, these lights have been exhibited from temporary buildings in the new position, bearing from each other S. by E. ¼ E.

The South Gare buoy has also been moved, and now bears from the spiral buoy S. W. by W. No. 1, black buoy, has also been moved about 40 fathoms to the westward, and now bears from the spiral buoy W.S.W., and from the South Gare buoy N.W. by W.

Masters of vessels and others entering the Tees are cautioned not to use the old light towers as day-marks until further notice.

RED BUOY AT THE ENTRANCE OF TYNE.—A red buoy has been placed at the end of the north pier now in the course of construction at the entrance of the river Tyne in 2½ fathoms depth at low water spring tides. Tynemouth Castle bearing N.N.W. at 250 fathoms from the Cliff, and the high beacon at South Shields a little open to the north of the low beacon.

[*All bearings magnetic. Var. in* 1857, 21° 5′ *W. off Lowestoft:* 23° 20′ *W. off the Tees;* 23° 30′ *W. off the Tyne. Decreasing* 6′ *annually.*

By order of the Light-house Board.

Washington, D. C., Oct. 5, 1857.

MEDITERRANEAN—GULF OF GENOA—FIXED LIGHT ON CAPE DELLE MELE.—Official information has been received at this office, that the Sardinian government has given notice, that a light has been established at Cape Delle Mele, on the western shore of the Gulf of Genoa, in the Department of Genoa.

The light is a fixed bright light, placed at an elevation of 307 feet above the level of the sea, and should be visible from the deck of a ship in ordinary weather at a distance of 20 miles.

The illuminating apparatus is dioptric, or a Fresnel lens of the first order. The light tower stands on the pitch of the cape, in lat. 43° 57′ 16″ N., long. 8° 10′ 38″ west of Greenwich, nearly. The form, color, and height of the light tower are not stated.

CAGLIARI HARBOR LIGHTS, SARDINIA.—Some error respecting the lights in the Gulf of Cagliari having crept into all the English Charts, the British Consul at that port has made known that the fixed light said to be on Point Fanale does not exist.

A new light-house, to carry a first class light, is now building on Cavoli island, off Cape Carbonera; and the government has decreed the erection of another, to show a fourth class light, on Cape St. Elia, which, however, is not yet begun. The only lights [illegible] the bay are two small *red* fixed lights, one on each side of the entran[illegible] [illegible]r inner harbor.

CHANGE OF LIGHT AT MESSINA, SICILY.—The Sicilian g[illegible] [illegible]tice, that on and after the 15th day of July, 1857, a fixed white lig[illegible] [illegible]very two minutes, will be substituted for the former light on the t[illegible] [illegible]sina.

The illuminating apparatus is a Fresnel lens of the sec[illegible] placed at an elevation of 132 feet above the level of the sea, and [illegible] [illegible]e deck of a ship in ordinary weather at a distance of 12 miles.

The tower is square, about 124 feet high from the [illegible] part of the Citadel point in lat. 38° 11′ 30″ N., long. 15° 34′ 50′ [illegible]

[*Variation in* 1857: *at Genoa,* 15° 40′ *W; at Cagliar*[illegible] 12° 45′ *W.*]

By order of the Ligh[illegible]

Washington, D. C., Oct. 5, 1857.

PORT OF LIVERPOOL. ENGLAND.—(*All Bearings by Compass.*)—**Official information has been received at this office that the Trustees of Liverpool Docks and Harbor have given notice, that the following changes in the buoying and lighting of the approaches to the port will be carried into effect on Monday, the 12th October, inst., and following days [weather permitted.]**

The buoys undermentioned being rendered unnecessary, or inconvenient, in their present positions by changes in the banks, will be removed, or, where requisite, superseded by new arrangements: C. 2, red can.
F. 4, red can.
Z. 1, black and white striped horizontally.
B. 1, black and white chequered nun buoy.
B. 2, black and white chequered nun buoy.

ALTERATIONS.—*Relative Change.*—Formby light-ship will be moved from her present berth, N. W. ¾ N. 1 mile and 20 fathoms, into 22 feet at low water.

Q. Fy., black pillar buoy, will be moved N. W. ¼ W. 155 fathoms, into 30 feet at low water.

Q. 1, chequered red and white can buoy, will be moved N. W. ½ W. 345 fathoms, into 11 feet at low water.

Q. 1, chequered black and white nun buoy, will be moved N. W. by W. ¾ W. 410 fathoms, into 11 feet at low water.

V. 2, black nun buoy, will be moved S. W. 32 fathoms, into 25 feet at low water.

V. 3, red can buoy, will be moved N. E. by N. 30 fathoms, into 12 feet at low water.

S. V. 1, striped horizontally red and white can buoy, will be moved N. W. by W. ¾ W. 185 fathoms, into 12 feet at low water.

V. 4, red can buoy, will retain its present position and color, but its denomination will be changed to C. 1; it will lie in 30 feet at low water.

The present C. 1, red can buoy, will be moved E. by S. ¾ S. 170 fathoms, and its denomination changed to C. 2, red, into 31 feet at low water.

C. 3, red can buoy with perch, will be moved N. N. W. ¼ W. 372 fathoms, into 44 feet at low water.

C. 4, red can buoy, will be moved N. N. W. 125 fathoms, into 25 feet at low water.

F. 2, red can buoy, will take the position of F. 3, red can, in 16 feet at low water.

F. 3, red can with perch, will be moved S. ½ W. 1$\frac{5}{16}$ miles off south spit of Jordan Bank, on the northwestern side of Crosby channel entrance, into Formby Pool, in 3 feet at low water.

K. 1, black nun buoy, will be moved W. ¼ N. 430 fathoms, on western end of shoal part of Newcome Knowl.

Bearings and Distances from new Positions.—Crosby light-house, S. E. by E. ½ E. easterly, 4¾ miles. Crosby light-ship, S. E. ¼ S., 2⅝ miles. N. W. mark, E. by N. northerly, 4½ miles. Q. Fairway buoy, N. W. by W. ½ W. westerly, 1¼ mile. V. 3 red can buoy, S. by W. westerly, ⅞ mile. V. 3, black nun buoy, S. W., ½ mile.

Formby light-ship and Crosby shore light in one, S. E. by E. ½ E. easterly, distant from Formby light-ship 1⅝ mile. Bell beacon and N. W. light-ship in one, S. W. ¾ W. nearly, distant from bell beacon 1 mile.

Formby light-ship, E. by S. ½ S., 1 mile. Q. Fy., N. W. ¾ W., ½ mile. Q. 1, black and white nun buoy, N. N. E. ⅞ mile.

Formby light-ship, S. E. ½ E., 1 mile. Q. Fy., W. by N. ¼ N., ¾ mile. Q. 1, red and white can buoy, S. S. W., ⅞ mile.

Bell beacon, W. N. W. nearly, 1½ mile. Crosby light-house, W. by N. ¾ N. V. 3, black, E. ¼ N. $\frac{9}{16}$ mile.

Formby light-ship, N. by E. easterly, ⅞ mile. V. 3, black nun buoy, W., ¾ mile. C. 1, red can buoy, S. E. by E. easterly, ¾ mile.

S. V. 1, nun buoy striped horizontally, N. E. ¾ N., $\frac{3}{16}$ mile. V. 2, red can, W. by N., ¾ mile nearly. C. 1, red can, E. by N. northerly, ½ mile nearly.

C. 1, red can, N. W. ¾ N., 1 mile. C. 3, red can buoy with perch, S. E. ¼ E., ¾ mile. C. 2, black nun buoy, N. by E., ⅞ mile.

Crosby light-ship, E. S. E., $\frac{5}{16}$ mile. C. 4, red can buoy, S. by E. ½ E., 1¾ mile. C. 3, black nun buoy, N. by W., ½ mile.

C. 3, red can buoy with perch, N. by W. ½ W., 1¾ mile. C. 5, black nun buoy, N. E. ¼ E., ¾ mile. C. 6, black nun buoy, S. E. ½ E., 1½ mile nearly.

C. 4, black nun buoy S. S. W., 1 mile. F. 2, red, N. ½ E., 1 5/16 miles. Formby life-boat flagstaff, N. E. ¾ E. F. 2, black nun, N. E. ¼ N , ⅞ mile nearly.

N. W. light-ship, W. ¼ N., 2 miles. Bell beacon, N. by E. ¼ E. easterly, 2¾ miles. H. 1, chequered black and white nun buoy, S. ¾ E., 2½ miles.

New Buoys will be placed as follows:—Q. 2, chequered black and white nun buoy, on southwestern edge of Zebra Flats, in 11 feet at low water.

Q. 2, chequered red and white can buoy, on northeastern edge of Little Burbo, in 12 feet at low water.

F. 2, black nun buoy, on N. W. side of northern spit of Formby Bank, west side of entrance to New Cut, in 6 feet at low water.

B. P., chequered black and white nun buoy, on shoalest part of Beggar's Patch, in 6 feet at low water.

Formby light-ship, S. E., ¼ mile. Q. 1, chequered black and white nun buoy, N. W. by W., ½ mile nearly. Q. 2, chequered red and white can buoy, S. W. by S., ⅜ mile.

Formby light-ship, E., ¼ mile. Q. 1, red and white can buoy, N. W. by W., ½ mile. Q. 2, black and white nun, N. E by N., ⅜ mile.

F. 2, red can, N. by W. ½ W., 1 mile nearly. F. 3, red can, S. W. ½ S., ⅝ mile nearly. Formby life-boat flagstaff, N. E. by E. ¾ E., ⅞ mile.

Spencer's pit buoy, W. by N., 1¼ mile. Leasowe light-house, S. by E. ½ E., 1¼ mile. R. 2. red can buoy, S. E. by E. ¾ E., ½ mile.

Remarks and Directions.—The effect of the above alterations will be to make the Queen's channel the channel for night navigation. the buoys in the Victoria channel being trimmed to the growth of the banks, and their general arrangement remaining the same as before. It may be navigated by daylight, great care being taken to make due allowance for the tide, which, during both flood and ebb, sets across this channel and over the banks on either side of it. The navigation of the Crosby channel in thick weather will be facilitated by equalizing the distances and straightening the line of buoys.

From a position 2 miles north of Point Lynas the Fairway Buoy at the Queen's channel will bear E. by S. ½ S, distant 39 miles, that line of bearing passing 4 miles north of the N.W. light-ship, and ¾ of a mile north of the bell beacon. The buoy Q. Fy. lies with the Formby light-ship (two white lights) on with the Crosby shore red light, bearing S.E. by E. ¼ E. easterly; and this line leads in the Fairway of the Queen's Channel, with not less than 10 feet water over the bar. The Formby light-ship lies in the elbow of the Crosby and Queen's channels, bearing N.W. northerly from the Crosby light-ship, her position being over towards the N.E. side of the channel: ships navigating the Crosby and Queen's channels should always alter course so as to pass to southwestward of her. The tide sets fair through these channels. From the Queen's channel northward to the line of the Zebra buoys the ground consists of ridges of sand, with from 5 to 9 feet water at low water: this part may be navigated after half-tide by vessels drawing from 16 to 17 feet.

The new buoy on the Beggar's Patch being on its shoalest part should be given a wide berth.

By order of the Light-house Board.

Washington, D. C., Oct. 10, 1857.

HARBOR LIGHT, SANTA CRUZ, TENERIFFE.—RED LIGHT ON MOLE HEAD.—Official information has been received at this office that the Spanish government has given notice that on the 1st of July last a fixed red light was established on the outer extreme of the Mole at Santa Cruz, Teneriffe.

The light is 21½ feet above the level of high water, and is visible at the distance of four miles.

As soon as the light is shown, all others on the Mole are screened.

Masters of vessels approaching the anchorage from the southward are informed that the light bears S. W. from it, and they are cautioned to keep it well open on the port hand, and to be careful of nearing the shore to the southward of the Mole with [illegible] fathoms in order to avoid some sunken rocks recently reported there. [illegible] aps six feet.

[*Variation in* 1857. 21° W.]

By order of the Light-House [illegible]

Washington, D. C., October 16, 1857.

ENGLAND. WEST COAST.—ROCKS IN BROAD SOUND.—Official information has been received at this office that several rocks having been lately discovered in the vicinity of Stokham Island and Broad Sound, near Milford Haven, during the progress of the Admiralty Survey under Commander Aldridge, R. N., the following notice is published for the benefit of the mariner:

1. A Rock awash lies to the northward of the east end of Stokham Island, 200 yards N.E. ¼ N. from the Stack.

2. A Rock with 2¼ fathoms on it lies in the same direction from the Stack at 400 yards off.

3. Two other Rocks, with 3½ fathoms, exist at 533 yards N.N.E. ¾ E. of the Stack. All these Rocks are directly in the track of vessels passing through the Sound to or from Milford Haven.

4. To the southward of Stokham Stack there are also Rocks with 3¼ fathoms at 820 yards S.S.E. ¼ E. from the Stack.

5. To the westward of Stokham Island, Rocks have been found in the race known as the Wild Goose Race, with 4½ and five fathoms, at 1,300 yards N.W. ¼ W. from the west end of Stokham island, and the west end of Skomer island, bearing N. by E. ½ E.

6. To the northward of Stokham island there are Rocks with from 3¾ fathoms to 4¼ fathoms on them, which lie midway between and in a line from the west end of Stokham island and the Mewstone of Skomer island, or 1¼ mile N.W. by N. from Stokham Stack.

7. A dangerous Rock with three fathoms on it lies directly in the track of vessels passing through Jack Sound to or from Milford Haven. It lies nearly ¼ mile W. by S. ¼ S. from the Bench rocks, with the outer point of Gateholm island bearing S.E. by S. 1,733 yards distant.

8. A Rock also lies off Long point, bearing W.N.W ¼ N. three-quarters of a mile distant, with 4¼ fathoms on it, the outer part of Gateholm island bearing N. by W. ¼ W.

[*All bearings are magnetic. Var.* 24° 40′ *W. in* 1857, *decreasing* 6′ *annually.*]

By order of the Light-House Board.

Washington, Oct. 16, 1857.

ATLANTIC OCEAN, FRANCE, WEST COAST.—PORT L'ORIENT.—LEADING LIGHTS FOR THE GREAT CHANNEL.—Official information has been received at this office that the French government has given notice of the following change in the position of the lower light of the Grand Pass or Great Channel to Port L'Orient:

On the 15th September ult., the lower light of the two fixed lights which, when in line, lead to Port L'Orient by the Grand Pass or Great Channel, will be removed in the same line of bearing to the south bastion of Port Louis, and will be placed in lat 47° 42′ 13″ N., and long. 3° 21′ 12″ west of Greenwich. Its height above the sea at high water will be 20 feet, and it will be visible at the distance of 8 miles.

The high light will be 1,826 yards from it in the direction of N. 83° E., and being 63 feet above the sea will be visible at the distance of 12 miles.

Commanders of ships are reminded that the compass course (N. 83° E.) on which these two lights lead in through the Great Channel must be left as soon as the two lights of the Little Channel appear over each other, and that these two lights kept in that position must be carefully steered for.

[*All bearings are magnetic. Variation in* 1857, 22° *W.*]

By order of the Light-House Board.

Washington, Oct. 16, 1857.

BLOCK ISLAND LIGHT-HOUSE, RHODE ISLAND.—A new light-house and keeper's dwelling have been erected on the extreme north point of Block Island, to replace the double light which was situated about ½ mile south from the new light-house.

The tower and keeper's house are built of brick, in connection, and both are white.

The house is of two stories. The tower is 14 feet square. Its base is 10 feet above high water, and the light is 50½ feet above the base, or 60½ feet above high water.

The temporary light exhibited during the erection of the new buildings will be discontinued on the 28th instant, from which date a single light will be shown from the new tower This light will be *fixed, of the natural color.* The illuminating apparatus will be a 4th order lens of the system of Fresnel, illuminating the entire horizon: but in the arc included between the bearings, (going round by the south,) E. 35° S., to S: 25° W. (true) it

will be hidden by the island. It should be visible from the deck of a vessel 15 feet above the water, in ordinary states of the atmosphere, a distance of 13 nautical miles.

By order of the Light-House Board.

Bristol, R. I., October 19, 1857.

LIGHT-HOUSES ON FLORIDA REEF—CHANGE OF CARYSFORT REEF LIGHT FROM A FIXED TO A REVOLVING LIGHT—NEW LIGHT-HOUSE OFF DRY BANK—DRY BANK LIGHT-HOUSE.—The new light-house near Coffin's Patches, off Dry Bank, on Florida Reef, is now approaching completion, and a light will be exhibited therefrom, on or about the 15th of March next (1858). This structure is on Sombrero Shoal, near Sombrero Key. It is an open framework of iron, built on iron piles. The roof of the keeper's dwelling is 47 feet above the water. From the top of the dwelling, and within the framework, a cylinder 7 feet in diameter rises to the height of 82 feet. This is surmounted by the watch-room and lantern, 12 feet in diameter, and 25 feet high. The whole structure will be 154 feet high, and will be painted red.

The illuminating apparatus will be dioptric, of the first order of Fresnel, showing a *fixed white light*, and illuminating the entire horizon.

The focal plane will be 141 feet above the mean sea level, and the light should be seen, under ordinary circumstances, from the deck of a vessel 15 feet above the water, a distance of 19 nautical miles.

The position of the light, as deduced by the Coast Survey, is: Latitude, 24° 37′ 36″ N. Longitude, 81° 06′ 43″ west of Greenwich.

Simultaneously with the first exhibition of the light off Dry Bank,

CARYSFORT REEF LIGHT, which is now fixed, *will be changed to a revolving-light* of the first order of Fresnel, *showing a bright flash once in every 30 seconds.*

Mariners are particularly cautioned not to mistake one of these lights for the other after the exhibition of the new light and the change of the Carysfort light from *a fixed to a revolving light.*

The height of the focal plane at Carysfort Reef light-house is 106 feet above the mean level of the sea, and should be visible, under ordinary circumstances of the atmosphere, from the deck of a vessel 15 feet above the water, about 18 nautical miles.

The approximate position is: Latitude 25° 13′ 15″north.
Longitude 80° 12′ 44″ west of Greenwich.

Due public notice will be given in advance of the exact time of the proposed changes.

By order of the Light-House Board.

Philadelphia, Pa., October 19, 1857.

PACIFIC OCEAN—CENTRAL AND SOUTH AMERICA.—The following notices have been received at the office of the Light-House Board:

FIXED LIGHT AT PUNTA ARENAS.—A *fixed* light has been established at Punta Arenas, in the Gulf of Nicoya, at an elevation of 65 feet above the mean level of the sea, and should be visible from the deck of a ship, in ordinary weather, at a distance of 10 miles.

The light-house stands between the point and the town, in latitude 9° 48′ 40″ north, longitude 84° 45′ west of Greenwich.

The light may be plainly seen when a vessel is a little to the southward of the Sail Rock, and by not bringing the light to the northward of N.N.W. it will lead clear of all danger up to the anchorage off the town.

ROCK IN HERRADURA BAY.—A danger [illegible] n discovered in Herradura Bay, on the eastern shore of the Gulf of Ni[illegible] of only two feet on it at low water of Spring tides, and is sometime[illegible] s much swell on. It lies nearly in the middle of the bay, with a [illegible] ring N.E. ¼ N. eight cables' length, and a Canon pinnacle S.W. by [illegible] At full and change of the moon, the tide rises about 9½ feet.

SHOAL OFF THE RIVER LE[illegible] d. having only 12 feet of water over it, on which two vessels have [illegible] d to lie off the River Lempa, about 10 miles off shore, and directly [illegible] ound from La Union to Acajutla. The shoal is about three miles [illegible] direction, and from its centre the val-cano of San Miguel (6,79[illegible] It lies in latitude 13° 2′ north, longi-tude 88° 19′ west of Gre[illegible] reason to believe that the whole of this Coast of Central Americ[illegible] ut eight miles too far north.

ROCKS IN SMYTH CHANNEL, MAGELLAN STRAIT.—A shoal in Smyth Channel, at the northwest end of Magellan Strait, was struck upon by by H. M. S. *Vixen*, when steering to the northward and attempting to take the passage between the east side of Long Island and King William Land. It extends across the passage, from the shore under Rose Hill to within half a cable's length of the beach on Long Island, has only six feet water on it, and the depths decrease suddenly from 25 to 4½ fathoms close-to. The bearings from the vessel when aground were, the southeast extreme of Long Island S. ¾ E.; and the highest point of the Island W. by S.

This extensive shoal, with a patch of rocks immediately in the fair way, (steep to, with only nine feet of water on them) renders this passage unnavigable: and vessels should follow the channel recommended in the Sailing Directions for South America, Part II, page 264, viz.: to the eastward of the Otter Islands, and then between the Summer Isles and Long Island.

[*All bearings are magnetic. Variation in 1857: In Gulf of Nicoya, 7¾° east; off the Lempa, 7¾° east; off N.W. end Magellan Strait, 22¾° east.*]

By order of the Light-House Board.

Washington, D. C., October 24, 1857.

TO MASTERS OF WHALESHIPS AND OTHER VESSELS.—As the longitude of Christmas Island and Fanning's Island is incorrect on most charts, we republish the correct location, as given in our issue of July 30:

FANNING'S ISLAND.—The harbor of Fanning's Island lies in N. lat. 3° 49′. W. long. 159° 20′. Approach the island from the east, and sail round the south side. There is no such island in this vicinity as is laid down on the charts as "American Island."

CHRISTMAS ISLAND.—The harbor, which is under the lee of the N.W. point of the island, lies in N. lat. 1° 58′, W. long. 157° 30′. The east point of the island lies about 45 to 50 miles eastward of the anchorage, and vessels in approaching cannot be too careful of this point, as it is here where nearly all the wrecks occur. The island is not more than eight feet in height, and cannot be seen from a ship's deck more than seven or eight miles off.

DIANA SHOAL.—This shoal has never, we believe, been laid down on any chart. It lies in N. lat. 8° 40′, W. long. 157° 20′. It was discovered by Captain English, of Fanning's Island, and has on it only six feet of water. The observation was taken at mid-day, within a short distance of the shoal, and may be relied on as correct.—*Honolulu Adv.*, *Nov* 5.

MARINE TELEGRAPH NOTICE.—Masters and officers of vessels bound to or past Honolulu are requested to take notice that a marine telegraph has been erected on the ridge connecting Diamond Head with the mountains inland, and all vessels passing within ten miles of the head will be reported. China bound vessels can display their signals without calling out a pilot. The national ensign at the main is a signal for having a United States mail on board for Honolulu. A signal should be displayed at the fore only when a pilot is wanted. Vessels can run along within two miles of the shore with perfect safety, and without any risk of losing the trade wind. A news boat will always be sent off to clippers passing the port without expense to the vessel.

NEW LIGHT AT THE PORT OF NEWCASTLE, AUSTRALIA.—Notice is given in the Government Gazette of October 9, that on and after the 1st January, 1858, the Coal Fire hitherto exhibited on the main land at the port of Newcastle, will be discontinued, and that a light from the lighthouse recently erected on Nobby's Island will be exhibited. The light will be a bright white fixed light, and will show from sunset to sunrise.

ADDITIONAL LIGHT AT THE ENTRANCE OF PORT JACKSON, AUSTRALIA.—Notice is given in the Government Gazette of October 9, that in addition to the revolving light now exhibited on the Outer South Head of the harbor of Port Jackson, it is the intention of the government shortly to erect a light-house on the Inner South Head, which will be a first class catoptric light, and exhibit a constant bright light at an elevation above the level of high water mark of 90 feet. Notice will be given of the time when this light will be first exhibited, as soon as it has been with certainty decided upon.

The French Minister of Marine has received the following intimation from the French Consul at Vera Cruz:—The high tower of the Convent de la Merced, which served as a landmark for vessels entering the roadstead of this port, was lately blown down during a heavy gale of wind from the north. The fact is published for the information of navigators, in order to prevent errors, or at least, some uncertainty, which might be caused by the disappearance of such a well-known mark.

OUR STATE ROOM.

CONFIRMATIONS BY THE SENATE, OF RESTORED OFFICERS.—The following naval officers, whose positions were changed by the operation of the Act of Congress of February 28, 1855, have been confirmed by the Senate, and restored to the active list of the Navy:

Joseph Smith, now a captain on the reserved list, to be a captain in the Navy, from the 9th of February, 1837, to take rank as such next after Capt. M. C. Perry.

Uriah P. Levy, dropped, to be a captain in the Navy, from 29th of March, 1834, to take rank as such next after Capt. Hiram Paulding.

Joseph R. Jarvis, now a commander on the reserved list, to be a captain in the Navy, from the 24th of May, 1855, to take rank as such next after Capt. Charles H. Bell.

John S. Chauncey, dropped, to be a captain in the Navy, from the 14th of Sept., 1855) to take rank as such next after Capt. Joseph B. Hull.

James Glynn, now a commander on the reserved list, to be a captain in the Navy, from the 14th of September, 1855, to take rank as such next after Capt. Robert B. Cunningham.

Robert Ritchie, now a commander on the reserved list, to be a captain in the Navy, from the 14th Sept., 1855, to take rank as such next after Capt. John Rudd.

John S. Nicholas, now a commander on the reserved list, to be a captain in the Navy, from the 14th of Sept., 1855, to take rank as such next after Capt. George F. Pearson.

Cadwallader Ringgold, now a commander on the reserved list, to be a captain in the Navy, from the 3d of April, 1856, to take rank as such next after Capt. Hugh Y. Purviance.

Isaac S. Sterett, now a commander on the reserved list, to be a captain in the Navy, from the 2d of March, 1857, to take rank as such next after Capt. Henry W. Morris.

Robert D. Thorburn, now a commander on the reserved list, to be a commander in the Navy, from the 3d of October, 1850, to take rank as such next after Commander William C. Whittle.

Samuel Lockwood, now a commander on the reserved list, to be a commander in the Navy, from the 18th of October, 1850, to rank as such next after Commander Robert D. Thorburn.

William S. Ogden, dropped, to be a commander in the Navy, from the 22d of April, 1851, to take rank as such next after Samuel Lockwood.

John Calhoun, now a commander on the reserved list, to be a commander in the Navy, from the 4th of November, 1852, to take rank as such next after Commander Robert G. Robb.

Murray Mason, now a commander on the reserved list, to be a commander in the Navy, from the 25th of February, 1854, to take rank as such next after Commander Henry K. Hoff.

William E. Hunt, now a lieutenant on the reserved list, to be a commander in the Navy, from the 22d of August, 1855, to take rank as such next after Commander John W. Livingston.

Matthew F. Maury, now a lieutenant on the reserved list, to be a commander in the Navy, from the 14th of Sept., 1855, to take rank as such next after Commander James F. Schenck.

James S. Palmer, now a lieutenant on the reserved list, to be a commander in the Navy, from the 14th of Sept., 1855, to take rank as such next after Commander S. W. Godon.

Robert Handy, now a lieutenant on the reserved list, to be a commander in the Navy, from the 14th of Sept. 1855, to take rank as such next after Commander Guert Gansevoort.

Henry Walker, now a lieutenant on the reserved list, to be a commander in the Navy, from the 14th of Sept., 1855, to take rank as such next after Commander B. M. Dove.

Lewis C. Sarter, now a lieutenant on the reserved list, to be a lieutenant in the Navy, from the 8th of Sept., 1841, to take rank as such next after Lieut. C. B. Poindexter.

Fabius Stanly, now a lieutenant on the reserved list, to be a lieutenant in the Navy, from the 8th of Sept., 1841, to take rank as such next after Lieut. Edmund Lanier.

John N. Maffit, now a lieutenant on the reserved list, to be a lieutenant in the navy from the 25th of June, 1843, to take rank as such next after Lieut. James D. Johnston.

Alexander Murray, now a lieutenant on the reserved list, to be a lieutenant in the Navy, from the 12th of August, 1847, to take rank as such next after Lieut. Joseph N. Barney.

Thomas H. Stevens, dropped, to be a lieutenant in the Navy, from the 10th of May, 1849, to take rank as such next after Lieut. W. C. S. Porter.

Van Rensselear Morgan, now a lieutenant on the rerserved list, to be a lieutenant in the Navy, from the 26th of October, 1849, to take rank as such next after Lieut. Wm. E. Boudinot.

Abner Read, dropped, to be a lieutenant in the Navy, from the 6th of February, 1854, to take rank as such next after Lieut· Henry K. Stevens·

George A. Stevens, dropped, to be a lieutenant in the Navy, from the 14th of September, 1855, to take rank as such next after lieutenant Leonard Paulding.

Augustus McLaughlin, dropped, to be a lieutenant in the Navy, from

the 14th of September, 1855, to take rank as such next after Lieut. Jonathan H. Carter.

Wm. W. Low, now a master in the line of promotion, on the reserved list, to be a lieutenant in the Navy, from the 14th of September, 1855, to take rank as such next after Lieut. Wm. P. Buckner.

J. Howard March, dropped, to be a lieutenant in the Navy, from the 15th of September, 1855, to take rank as such next after Lieut. John L. Davis.

James S. Thornton, dropped, to be a lieutenant in the Navy, from the 15th of September, 1855, to take rank as such after Lieut. Alexander A. Semmes.

Edmund C Crafton, now a passed midshipman on the reserved list, to be a lieutenant in the Navy, from the 15th of September, 1855, on the active list, to take rank as such afterLieut. Joseph Fry.

The following dropped officers, placed on the reserved list, have been confirmed:

Samuel. W. Lecompte to be a commander in the Navy, from the 8th of September, 1841, on furlough pay.

Wm. A. C. Farragut to be a lieutenant in the Navy, from the 9th of December, 1844, on leave of absence pay.

Richard W. Meade to be a lieutenant in the Navy, from the 20th of December, 1843, on furlough pay.

Thomas Brownell to be a lieutenant in the Navy, from the 26th of December, 1843, on furlough pay.

Julius S. Bohrer to be a master in the line of promotion in the Navy, from the 1st of March, 1854, on leave of-absence pay.

Nathaniel T. West to be a passed midshipman in the Navy, from the 10th of August, 1847, on leave-of-absence pay.

The following transfers from the furlough to the leave-of-absence pay, of the reserved list. have been confirmed :—

Captains.—Jesse Wilkinson, Thomas M. Newell, Willlam K. Latimer, John H. Graham., and William Inman.

Commanders.—Charles T. Platt, Henry Bruce, and Charles H. Jackson.

Lieutenants.—Peter Turner, Gabriel G. Williams, Simon B. Bissell John J, Glasson, Henry A. Steele, William Chandler, James M. Gillis, John P. Parker, Edward C. Bowers, Augustus S Baldwin, William B. Whiting, and Mathias C. Marin.

Master.—R. Clarendon Jones.

Passed Midshipman.—Samuel Pearce.

NAVAL INEELLIGENCE.—The United States steam frigate Niagara went into dry dock at the Brooklyn Navy Yard, on Saturday afternoon, the 23d inst. It having been ascertained what outside repairs are needed, upon an examination had into her condition, her stay in dock will be brief.

Lieut. P. H. W. Fontain, of the Brooklyn Marine Barracks has been ordered to the United States ship Colorado, lying at Norfolk, Va.

The following Engineers have been ordered to the United States steam frigate Colorado, at Gosport:—Chief Engineer—W. W. Wood; First Assistants—F. C. Dade, T. A. Shock; Second Assistants—J. W. Moore Alexamder Grier; Third Assistants—Charles H. Levy, F. K. Hain, John Purdy, Philip Inch.

The following Engin eers have been orderered to the United States steam frigate *Niagara*, at New York:—Chief Engineer—J. Follansbee; First Assistants—John Faron and Wm. S. Stamm; Second Assistants—M. Kellogg,, Geo. Johnson; Third Assistants—Jackson McEllmell,—Kutz; —Baily,—Buechler.

CHARTS.—We have received from the Navy Department six Lithographic Charts, comprisihg track surveys of the Rivers Paraguay and Parana, made by Commander Thomas S. Page, in the U. S. Steamer *Water Witch*, 1855.

OBITUARY NOTICE.—Commodore Stephen Cassin died at Georgetown, September 5th, aged upwards upwards of seventy years. He was on the retired list at the time of his death, having been in the naval service since the year 1800—fifty-seven years.

HOW HE CELEBRATED THE ANNINVERSARY OF THE BATTLE OF NEW ORLEANS.—Intelligence from Marseilles reports that the American ship *Adriatic*, which was confiscated by the French Court of Appeals, on account of her collision with the steamer *Lyonnais*, had made her escape from detention at that port, and put to sea on the night of the 8th of January. A French war steamer went in pursuit, but had not overhauled her.

CHRONOMETERS.—We have been requested to advise ship-masters that two first-rate Chronometers may be had at very reduced prices, such as cannot fail to give satisfaction. Their whereabouts may be known by application to office U. S. NAUTICAL MAGAZINE.

THE

U. S. Nautical Magazine,

AND

NAVAL JOURNAL.

VOL. VII.] MARCH, 1858. [No. 8

WHY DO NOT MAIL AND PASSENGER STEAMSHIPS PAY?

At this time, when trade and travel has been paralysed by the reacting influences of an inflated credit system, it is well to pause, and consider what are the grounds of discouragement to the progression of passenger and mail steamship construction. It is an undisputed fact that the agents of most of the lines of steamships declare no dividends to the owners, notwithstanding the most rigid surveilance is maintained in the affairs of some if not in all the various lines.

The energy of American merchants is not at fault, when there is an equal chance with with competitors for reaping the legitimate fruits of commercial industry. The shipbuilder is not at fault; he builds a ship which costs him about all that he gets, and often more. The engineer is not at fault, by charging too high a price for the engine he builds; he cannot afford to do more than one hundred cents worth of work for a dollar. The ship owner cannot afford to pay a higher price for the construction of his ships, seeing that they do not pay interest, depreciation, insurance, wear and tear, and commissions. What, then, is to be done, to make our steamships pay? This is a question of some moment, and one we propose to answer, as we hope, to the satisfaction of merchants, ship-builders, and engineers.

First, we say, *look at the service to be performed by ocean transit steamers, and then classify the several kinds of service, and suit the vessel to the service required.* No one should object to this, as a prudential measure. There may, however, be some who will charge us with impracticable views, even though we should strictly adhere to the line of policy already laid dow[illegible] should a measure so reasonable be objected to? We am[illegible] the present steamship owners would be glad

to maintain the control of the several channels of ocean steam transit; having met with severe losses in the establishment of lines of steamships, they deem themselves justly entitled to the profits (if any there be, whether arising from commissions or dividends,) growing out of the enterprise thus established. We admit the force of the reasoning, but we cannot remain idle spectators, at the induction of a stationary line of policy, by which steamship proprietors are enabled to hold the great commercial interests of our country, within the narrow compass of their own purse-strings, We cannot afford to permit the same course to be pursued which has been marked out by the present lines, until our entire steam transit is in the hands of foreign capitalists, which it most assuredly will be, unless we awake to our position, and change our course. *We can build vessels cheaper than England can, we can run them cheaper than she can*, yet English steam vessels make money for their owners, and ours do not; because we do not adapt the vessel to the service required. Steamship owners should remember that carrying first class cabin passengers, is not the only trade between the port of New York and that of Liverpool. While they are building steamships for the accommodation of from 250 to 400 cabin passengers, let them remember that the *average number* of passengers the vessel will get to carry during her life-time, will not exceed 100, at most; and that the portion of ship which must always go empty, and the extra power to propel it, with the interest, wear and tear, depreciation, etc., is taken from their dividends. It should not be surprising, then, that those dividends are small.

The observing man cannot fail to discover that we are fast tending toward a daily arrival and departure of ocean steamers between the United States and the Old World; and it is equally apparent that the travel cannot be monopolized by any one line of steamers, unless at ruinous rates, provided all lines are using the same class and size of vessels. Now if it be true, that the average number of first class passengers travelling between New York and Liverpool, for example, does not exceed, in any one vessel, 100, taking the year through, east and west, is it not plain that no more than that number should be provided for, and that the increase of travel should be met by the increased number of ships, and not by increased size? The principle is precisely the same as with the mails—the Government pays according to the number of trips, and not by the bulk of the mail; just so with passengers—if ship-owners would carry more, let them so arrange their vessels. The *Adriatic* will accommodate say 400 state-room passengers, and cost $800,000. Is it not plain that she, being a mail steamer, cannot wait to have those state-rooms filled? Passengers are not like freight, that a week, more or less, added to the passage, is of little consequence; time is money to passengers, and they understand it. Now

who will say that four steamers, at $200,000 each, will not carry 100 state-room passengers, with the mails, and the coals necessary to make the passage, in the same time as the *Adriatic?* But we may be told that small steamships are not as safe as large ones. We ask, why? *They are stronger*, and, if properly modelled and constructed, are safer: the ratio of loss to human life proves this. But we may be told that the cost of working four vessels, in lieu of one, would greatly increase the expense for doing the same work. We say, no; there must be a sufficient number of persons attached to the vessel to work her, and to provide for the 400 passengers in the large ship, all the time, because, forsooth, she may have a full complement on one of her trips, during her life-time.

But we have said nothing about the four mails, instead of one; we have said nothing about the more favorable rate of insurance; we have said nothing about the advantages of having a line of steamships doing the special service required of that line, and all the service offered to the line, for the same amount that it now costs in a single ship, viz.: that of carrying all the passengers, and doing four times as much mail service, which is the best paying service performed by steamships. But we may be told that we have taken no account of freight in the smaller steamers. We say, no, nor do steamship owners, now they are beginning to find out how much it costs to carry freight in mail steamers; it does not, actually, do more than pay for taking it in and out of the vessel. Then why talk of freight, in vessels whose expenses are $45,000 per trip to Havre and back, per ship, and that of the Collins line even more per ship? and yet, in the line referred to, there is no extravagance; it is one of the best-governed lines of steamships afloat. Here is the secret: the principle is wrong. A ship that will carry more than double the amount of freight that the *Adriatic* can possibly stow, within twenty-three feet draught of water, can be sent to Liverpool and back for $10,000. How, then, is it possible for mail steamers to carry freight and make money? But we are told that passengers cannot be stowed in the hold. What shall be done with that part of the ship? It had better go empty, now that you have got it, than that it should cause you to lose money by feeding it, instead of its feeding you. The extra coal burned by the increased length of the voyage, must have convinced steamship owners that, to carry freight requires a different kind of vessel from that of a mail steamer. Better put another deck in the hold, and carry third-class passengers, which are now taking passage in vessels *constructed for that especial service*, and, as a consequence, are making money, than to carry freight.

It must be plain to every comprehensive mind, that our mail steamers are not adapted [illegible] which they are engaged, and that this

is the reason why they do not make money for their owners. The mania for large ships is sure to die out with the *Leviathan* and *Adriatic*, and why? Simply because they are not adapted to the service. The builder of the *Leviathan*, Scott Russell, tells the shareholders that she is "too small" for the service, even as she is; that is to say, that she will scarcely carry coal enough to take her to Australia and back, forgetting that the vessel was ever intended to do anything more than to burn coal. We do not hear anything about the number of lay days that will be required to fill up the hold with freight, or whether a smaller vessel might not make one half of the round voyage, while the *Leviathan* will be waiting to fill up with freight and passengers.

Building larger steamships than the service actually requires, is like building railroads through sparsely-populated sections of the country. Had the *Leviathan* been thirty, instead of sixty feet deep, with the same length and width she now has, *she would have carried coal enough, freight enough, and passengers enough*, because all the freight and passengers she will get, allowing a reasonable time to wait for them, and would have made the voyage in less time than she now can. There is no mistaking this principle in nautical construction; any and every commercial man knows that a properly modelled steamship will perform better when buoyant, than when overloaded—when with light, than with heavy draught of water. Now the same principle that we have applied to the *Leviathan*, is applicable to the *Adriatic*, the *Arago*, and indeed, all our lines of steamships; *they are too deep*, and consequently draw too much water, because depth increases the draught of water, while breadth reduces it. If there were but two decks in those ships, instead of four, they would pay; and why pay then, and not now? Simply because the vessel, weighing less, by at least one third, *could make better time with less coal*, and by making better time, they could secure their share of passengers; one fourth, if not one third of the ship's company could be discharged, the state-rooms would always go full of passengers, and the whole ship would be brought into paying service. But some one will doubtless suggest the idea, that there might be more passengers than the ship could carry, with her reduced facilities. Then, we say, build another ship and place her on the line, until the line becomes a daily line: and should it go beyond this, then increase the length and breadth of the ships, *but not the depth. Depth is the bane of successful navigation.* It costs more to build the ship, it costs more to propel it, it costs more to mann it, it costs more to repair it, it costs more to insure it, it costs more in wear and [illegible] and it costs more in port charges, and in every [illegible] a moth on the profits of the vessel. But some [illegible] perhaps an engineer, that it is more economical to [illegible]

ers; that their expenses are much less than side-wheel steamers, and that they should have a heavy draught of water to use their screw to advantage; that they should be built of iron, etc. Hold, my friend of the screw. You are counting without your host. That very fact, that they require a heavy draught of water, settles the question of efficiency, with regard to speed. Here is the difficulty—our heavy draught paddle-wheel steamers should have screws, instead of paddles. The paddle-wheel requires a light draught of water, and so does speed; these two qualities act in unison; the paddle-wheel harmonizes with the best model for speed, while the screw selects the worst—this fact settles the question, for the present, in reference to the highest speed for mail steamers. So long as engineers insist upon large immersed screws for efficiency, so long must they be content to follow in the wake of paddle-wheels, rather than lead them, for the highest speed attainable. That the screw is less expensive, both in first cost, space required, and daily use, we readily agree; but for the highest speed, more improvements are necessary to adapt it to the best models.

As to iron for ocean steamship construction—it costs more to do the same service, and the ship is more liable to founder, and consequently, is not as safe.

There is a point in the management of our ocean steamers, which should secure notice from us. The present mode of providing for passengers, is wrong, and should be abandoned at once. There is as much provision wasted as is consumed, in many instances. *The Restaurant principle* should be adopted. It would be better for both the passenger and shipowner. The present arrangement is a waste of space in the ship, a waste of labor in the number of stewards required, and a waste of money, in the increased supply necessary. But it may be asked, what shall be done with the ships we have in the several lines of mail and passenger steamers? We say, keep them, and wear them out, but not by carrying freight. Let the entire ship be devoted to passengers, by introducing another, say third class; and when another ship is required in the line, build one of the type of model adapted to the service required, viz.: that of carrying the mails and a number of passengers equal to the average number carried by the most favored ship in the line. By this means, we shall be able to gain the ascendancy in the rapid transit of ocean mails and passengers, over foreign rivals, and steamship agents, owners, builders, and engineers, will make money, by building steamships for the establishment of new lines, [illegible] *—ving principle.*

ATHERTON'S TABLES,

FOR DETERMINING THE CONSTRUCTIVE TYPE, AND PROPORTIONATE POWER OF STEAMSHIPS.

OUR industrious trans-Atlantic friends, in the engineering department, have labored long and assiduously, to establish a rule by which they may be able to determine the amount of propulsory power required for vessels of all sizes, and of all types of model and construction. Like Mr. Brunel, who said (to himself,) when preparing to launch the *Leviathan*, "there is nothing like iron," though it be for ground and bilge ways, for launching vessels, they insist that, because there is a theory, for the application of proportions to all branches of mechanism, there must be one for connecting Marine Architectural Science with that of Marine Engineering; and without a knowledge of the first principles of Marine Architectural Science, as is abundantly manifest from his labors, the engineer of a dock-yard at Woolwich sets about regulating the affairs of the commercial world, in steam navigation. In order the more successfully to accomplish his purpose, he appears before the British Association for the Advancement of Science, and reads a paper, to which is appended, tabulated ratios of principal dimensions, with power, speed, etc. By the aid of the press, he is enabled to promulgate to the world the result of his labors, as the *vade mecum* of steamship construction. Were it not for the reputation of this Association, in the scientific world, by which this heresy is countenanced, and the respectability of the press, through which this falsity is promulgated, in connection with the mischief it has already done, and is likely to do, on this side of the Atlantic, we should have let it pass unnoticed, as not worth the space required, (however brief,) to expose its fallacy.

Mr. Atherton prefaces his tabulated formulas by remarks on the "difficulty which attend all investigations, and all discussions on maratime affairs, in conssquence of the technical terms in which shipping, especially steam shipping, is spoken of and officially registered, as respects the size or magnitude of vessels; these he endeavors to explain, and having found, as he supposes, the philosopher's stone, he proceeds to show how he has demonstrated approximately, the proportional increased rate of pecuniary cost which attends an increased rate of speed, at which freight or cargo per ton weight, may be conveyed by steamships, of any definite size and type; and having extended his remarks to a wearisome length, he finally sums up the evidence in a tabulated form.

The first table, named A, purports to show the constructor's dimensions, elements of construction, and mutual ratios of tonnage and load dis-

placement; while table B purports to show the relation of displacement, power, and speed of steamships, assuming that vessels of similar proportions have similar type of form, and that engines have proportionally equal efficiency, as determined by the unit of indicated horse power. He concludes by setting it down as a fixed fact, that to attain a speed of twelve knots per hour, in a freighting ship of 500 tons, one horse power for each ton of displacement would be required; while for a vessel of 25,000 tons displacement, to attain the same ratio of speed, but one-fourth of the above proportion would be required. Now it was upon the same principle that is here boldly set forth as a truism in science, that Mr. Brunel attempted to launch the *Leviathan*, but how grave his error, history will record. Why, if this formula were true, it would only be neceesary to keep on increasing the size of the vessel, by carrying up the proportions, and at the same time reducing the speed of the vessel, when it would require no power at all; she would go without steam power; the vessel, by the same theory, might perhaps become a source of power without engines or sail. Mr. Atherton has given no credit to the model for any superiority; it is only the dimensions and displacement he recognises; the longer and larger the vessel, the faster she will go, and that with the least proportiouate amount of power. Now we say that, IT IS THE PROPER, OR IMPROPER DISTRIBUTION OF THE DISPLACEMENT, WHICH ADDS TO, OR DETRACTS FROM THE SPEED OF VESSELS, THE POWER AND WEIGHT BEING THE SAME.

Mr. A. will be surprised, when we tell him that, with given principal dimensions, given displacement, given load draught, and indicated horse power, in two vessels, the same for both, one vessel may *be made faster than the other, by at least three knots per hour*, and yet such is the fact. How unwise, then, for engineers to ignore the model of the vessel, and dealing in theoretical abstractions, lead the commercial world astray. That there is, proportionally, a financial gain by building large vessels, we admit, *provided they are not too large for the service, like the Leviathan and Adriatic, for example*, having more space for passengers and freight than there are passengers and freight to go in a given time. Better go twice full in a small vessel, than once half, or even three quarters full, in a large one; better have 100 small ships employed than one large ship idle, for the reason that there is not freight enough for any foreign port to fill her, or because she draws too much water to get in at the required port.

In reference to Mr. Atherton's rule, it is calculated to do much harm. The speed of the several models presented for competition, for the steam sloop of war, was attempted to be measured by this rule, and most signally failed, inasmuch as one among the fastest, if not the fastest

model, was set down for the dullest speed of the whole, and in reference to the engines, they, too, were misjudged by this rule.

There is room enough for improvement in the mode of determining the power of engines, to employ all the powers of Mr. Atherton's fruitful imagination, and it is most surprising that he should have left his peculiar field of inquiry and improvement in such a crude state, to embark in another, still more difficult, and about which he evidently knows but little.

Let Mr. Atherton come to the witness-box, and tell us, if he can, what the raising of 33,000 lbs., one foot high in one minute, has to do with the instantaneous thrust of a cylinder piston upon an engine, the only correct mode of determining steam power? If Mr. A. is at a loss here, in his own department, how much less does he know of the relations of form, for overcoming fluid resistance upon floating bodies, for purposes of utility; and before leaving the witness-box, let him tell us, if he can, what the number of square feet of immersed midship section of a vessel, has to do with the propulsory power required to secure a determinate speed? The world has been humbugged about long enough by such visionary superficialities. Or let Mr. A. tell us what the length has to do with the speed? inasmuch as reducing the breadth is equivalent to increasing the length of a vessel, and if the breadth be reduced, until the displacement becomes less than the weight of the vessel, she sinks without cargo, how much steam power would be required to carry her down? Will Mr. A. tell us? How long will the Marine Engineering world allow themselves to be made the dupes of visionary men?

YACHTING.—The Thames Iron Works, Blackwall, (Eng.) launched an iron yacht, on the 17th of Dec. last, 180 ft. long, 18 ft. wide, to be fitted with paddle-wheel engines of 120 H. P. She is intended for the use of the imperial family in Austria, and has been constructed under the direction of Messrs. George Rennie and Son, Engineers. It is said by the London *Artizan*, that several distinguished members of the Austrian Government were present at the launch, and were much pleased with the appearance of the vessel.

Had they known anything of value, about the matter, they would have been *much displeased* at the adoption of such bad dimensions. The draught of water tells the story, if nothing else; for that breadth a vessel of 120 ft. may be made to steam faster than this imperial yacht; she must be loaded down to give her stability. *Most likely she was built by the pound, like American steam boilers.*—[ED.

RUSSIAN TABLES OF THE STRENGTH OF HEMP RORE AND IRON CHAIN.

(*Continued from page* 103.)

A TABLE SHOWING THE STRENGTH OF FOUR STRAND CABLE LAID ROPE OF RUSSIAN HEMP.

Size in inches.	*No. of Yarns.*	*Weight of 100 sagins in poods.*	*Breaking Strain in Poods.* *Greatest Strain Applied.*	*Medium Strain Applied.*		*Least Strain Applied.*	*Av'age Strength in Poods.*
12	819	101.31	1500	1425	1361	1275	1390
11½	741	92.86	1361	1350	1300	1300	1327
11	676	85.21	1325	1315	1275	1250	1291
10½	624	70.32	1225	1211	1179	1134	1187
10	572	63.29	1125	1116	1109	1109	1112
9½	520	59.00	975	925	891	875	916
9	468	52.33	950	916	880	863	902
8½	416	47.08	844	841	825	775	821
8	364	41.00	838	835	825	775	818
7½	312	36.35	662	657	636	625	645
7	273	31.14	580	566	555	550	563
6½	234	28.01	565	513	500	500	519
6	208	23.20	435	425	410	404	418
5½	182	19.10	390	368	360	350	366
5	144	16.01	329	325	325	312	322
4½	117	13.11	265	246	245	233	247
4	91	10.23	208	206	200	200	203
3½	65	7.12	145	143	140	137	141
3	52	5.29	129	125	121	121	124
2½	39	4.14	106	106	100	96	102

A TABLE SHOWING THE STRENGTH OF IRON CHAIN WITH STUDS—RUSSIAN IRON.

Size in Diam.	*Weight of 100 sagins in Poods.*	*Breaking Strain in Poods.* *Greatest Strain Applied.*	*Medium Strain Applied.*				*Least Strain Applied.*	*Medium Av'ge.*
2¼	751.2	8056					7580	7784
2 1-8	670.1	7184					6714	6948
2	593.6	6368	6337	6244	6028	5997	5951	6152
1 7-8	521.7	6121	6043	5781	5564	5502	5440	5776
[illegible]	454.5	5270	5039	4977	4143	4049	4019	4581
	391.8	4637					3679	4111
	338.9	4049	4049	3663	3570	3399	3369	3679
	[illegible]0.6	3813					2745	2998
	[illegible]9	2647					2182	2380

1 1-8	187.8	2040	1968	1793	1798	1700	1669	1824
1	148.4	1685	1607	1580	1422	1406	1360	1502
7-8	118.6	1391	1329	1304	1280	1267	1255	1304
3-4	83.5	927	881	865	788	780	773	835
11-16	70.1	760					667	705
5-8	57.9	610	608	587	587	587	579	587
9-16	46.9							
½	37.1	389					365	371

A TABLE SHOWING THE STRENGTH OF IRON CHAIN WITHOUT STUDS—RUSSIAN IRON.

Size in Diam.	*Weight of 100 sagins in poods.*	*Breaking Strain in Poods.* Greatest Strain Applied.	Medium Strain Applied.		Least Strain Applied.	*Medium Av'ge.*
1 5-8	429.7	4637	4618	4606	4204	4513
1½		3957			3597	3852
1 7-16		3648			3326	3549
1 3-8		3351			3066	3264
1 5-16		3078			2813	2992
1¼	206.5	2801			2578	2726
1 3-16		2547			2350	2479
1 1-8	179.5	2306			2133	2244
1 1-16	154 5	2077			1929	2021
1	124.2	1861			1737	1811
15-16	110.4	1657			1558	1618
7-8	95.2	1465			1391	1428
13-16	80.	1292	1252		1236	1261
3-4	70.	1100			1026	1070
11-16	52.7	921			835	902
5-8	43.7	760			668	742
9-16	29.2	618			538	600
½	22.8	488			427	476
7-16	16.	371			321	365
3-8	10.8	272			235	266
5-16		185½			166½	185½
¼		117 3-4			104	171½
3-16		67 3-4			59 3-4	61 3-4

A TABLE SHOWING THE COMPARATIVE STRENGTH OF CHAIN, CABLE ROPE, AND COMMON ROPE —RUSSIAN.

Chain without Studs.	*Three Strand Common Rope.*	*Four Strand Common Rope.*	*Chain with Studs.*	*Three Strand Cable Rope.*	*Four Strand Cable Rope.*
			2 1-8	26	
			2	22½	
			1 7-8	21 3-4	
1 5-8			1 3-4	19 3-4	
			1 5-8	19	
1½				18½	
			1½	18¼	
1 7-16				18	
1 3-8				17	
1 5-16			1 3-8	16½	
1¼				15½	
1 3-16	12			14½	
	11 3-4		1¼	14¼	
1 1-8	11½			13 3-4	
1 1-16	11¼			13½	
	11			13¼	
	10 3-4			12 3-4	
	10½			12½	
1	10¼		1 1-8	12	
	10			11 3-4	
15-16	9 3-4			11½	
	9½		1	11¼	
7-8	9¼			11	
	9			10 3-4	12
	8 3-4	9½	7-8	10½	11½
13-16	8½	9¼		10¼	10 3-4
	8¼	9		10	10½
	8	8½		9 3-4	10
3-4	7 3-4			9½	9 3-4
	7½	8¼		9¼	9½
	7¼			9	9¼
11-16	7			8 3-4	8 3-4
	6 3-4	8	3-4	8½	8
5-8	6½	7 3-4		8¼	7 3-4
	6¼	7½	11-16	8	
	6	6½		7½	7½
9-16	5 3-4	6¼	5-8	7¼	7¼
	5½	6		7	6 3-4
	5¼	5 3-4		6 3-4	6½
	5	5¼		6½	6¼
	4 3-4			6¼	6
		5		6	5 3-4

7-16	4½		½	5 3-4	5½
	4¼			5½	5
	4	4½		5¼	4 3-4
3-8	3 3-4	4¼		5	4½
	3½			4 3-4	4¼
		4		4½	
	3¼	3 3-4		4¼	4
5-16	3	3½		4	3 3-4
	2½	3¼		3 3-4	3½
¼	2¼			3½	3
		3		3¼	2½
	2	2 3-4		3	
	1 3-4				
3-16	1½	2½			

SPEED OF THE LEVIATHAN.

A CORRESPONDENT of the London *Artizan* discourses thus about the speed of the *Leviathan:*

With the paddle engines only, 16 miles an hour, and with the screw and paddle engines combined, he rates her speed at 25 miles per hour.

Another correspondent, having a larger share of common sense, draws the following deductions, from the principal dimensions of the vessel and engines, premising that the combined power of both paddle and screw engines, working at a steam pressure of 20 pounds above the atmosphere, is taken in all cases, viz.:

Speed at	20 feet	draught,	18½	geographical miles
"	25 "	"	16½	" "
"	30 "	"	15	" "

It is very doubtful whether she will ever attain the more moderate speed of the above rates, even at the measured mile, which is not a fair test of any vessel's speed.

THE SUEZ CANAL.

This may very properly be regarded as one of the great enterprises of the age, and cannot fail to benefit every commercial nation on the globe.. The only wonder is, why the English government should oppose its immediate commencement, when the whole nation have been speaking, by commissions appointed to give force to their opinions. It cannot be that it is for the sole love of opposing the best interests of England, but doubtless it arises from a fear, lest some other nation should reap as much advantage as England, the United States, for example. The Editor of the *Commercial Traveller's Magazine* furnishes some pertinent remarks, not only for Englishmen, but for Americans. We hope they will be appreciated on both sides of the Atlantic—the American is not less interested than the English merchant, in the Suez Canal; but hear him:

An undertaking which would shorten, by 5,000 miles, the ship route to our eastern possessions and our eastern markets—which would make that ship route available for steamers—which would increase the consumption of coal and the construction of machinery—which would stimulate emigration to British colonies, and open two countries, like Arabia and Abyssinia, to the invasion of our traders, and an undertaking, finally, which would tend to remove from our hearths the grim spectre of a cotton famine, is the undertaking of all others which appeals most strongly to the private and public interests of every man within these islands. Capitalists and manufacturers, ship-owners and coal-owners, masters and men, taxpayers and rate-payers, all are interested in it. They should all, as a good many of them have already done, insist on its immediate execution.

But the execution is the great difficulty. Not that the work to be done is formidable enough to scare our engineers, nor is the expense so large as to frighten capitalists. The engineers are all of one mind, that the work is easy, and the men of capital are equally of one mind, that, as an investment, the Suez Canal is a splendid speculation. But it is the old story: the Government stops the way. It is a very old story, and one not confined to this country. Boys read at school how Columbus, the Genoese, went from court to court, supplicating, and in search of some one who would take from him the New World he knew he should find in the West. Mr. Waghorn, in his time, spent the best years of his life in quest of a statesman who could rise to the magnitude of his overland scheme. Mr. F. de Lesseps offers, as it were, to move the old earth, and put down the East nearer, by 5,000 miles, than it has hitherto been, and, of course, his is the fate of Columbus and Waghorn. The Viceroy of Egypt wishes to see the Suez Canal executed; but he is a Viceroy, and his suzerain, the Sultan, has a voice in the matter. The Sultan, too, is most favorable, and one-half of the Suez Canal could, by this time, be made, were Abdul Mejid the only Sultan in Turkey. But there is another Grand Turk at Constantinople—another luminary, who shines with a light so strong, though borrowed, that it eclipses the star of the Padishah. The British ambassador at Constantinople opposes the execution of the Suez Canal project, and his decision decides the question, until the British nation compels him to revoke it. It would be as impolitic as unsafe, to make the Suez Canal in opposition to the emphatic veto of the representative of England, who, in this case, however, most flagrantly misrepresents his nation.

It is to establish this fact of Lord de Redcliffe's misrepresentation, that M. de Lesseps has been invited, by his English friends, formally to submit his project to all the great commercial bodies of the kingdom, and demand from each a declaration on the subject of the Suez Canal. In this manner he has collected the votes of Liverpool, Manchester, Dublin, Cork, Belfast, Aberdeen, and Edinburgh; and within the next few weeks he will gather the opinions of Newcastle, Hull, Leeds, Southampton, Birmingham, Bristol, and London. In all the meetings of the Commercial Associations and Chambers of Commerce, of which we have seen the reports, the opinions recorded have been unanimous and emphatic, to the effect that a short ship route to the East, by means of the Suez Canal, is desirable, and that the execution of the project would serve the best interests of British commerce. We have no doubt as to the results of the meetings still to be held. The merchants of England are judging the case which Lord de Redcliffe presumed to prejudge for them.

But why has he prejudged it? What are his motives, and what are the motives of Government, which, if it does not actually support him, at all events leaves him to go his wilful way? No one can tell.

But the time for the solution of the mystery is approaching fast. The press of England has already spoken out. British commerce is recording its votes in favor of the Suez Canal and when this manifestation is completed by the crowning resolution of the great traders of London, the world will know, for certain, what has long been suspected, that it is not Great Britain which opposes the progress of the age. In the struggle which is still in store for the promoters of the canal, they will have the proud consciousness of the co-operation and support of the people of England.

GUN BOATS FOR INDIA.

The East India Company, having determined upon the construction of a flotilla of gun-boats of small capacity, and very light draught of water, for the purpose of navigating the narrow and shallow streams of India, where row-boats only have been able to penetrate, have given Messrs. George Rennie & Sons an order for several of these vessels, to be built upon their patent principle. The first of this flotilla has been completed, and has made several trial trips by way of experiment. The average speed of six runs was found to be nine knots, the engines, (two in number) making 350 revolutions per minute. The indicated horse power being 76 horses. Pressure in boiler, 50 to 60 lbs.

The engines are high pressure, and rated at 10 H. P.; are horizontal and direct acting, each being independent of the other, and attached to a separate screw propeller, one under each quarter.

The dimensions are, 70 ft. long, 11 ft. wide. Draught of water, with 5 tons of coal in bunkers, 2 ft. forward, 2 ft. 6 in. aft. They have no proper deck; are divided into three sectional water-tight compartments. The magazine, shell, store-room, and galley ... by the forward section; the midship section contains the ... coal; while the after

section is fitted with a deck-house, for officers and crew, with suitable ventilation, such as is adapted to the hot climate of India; a separate apartment being arranged for the captain. The armament is a long brass 12 pdr. of 18 cwt., and is arranged so as to traverse a circle, and command both sides of the river. By being divided into sections, they are readily taken apart, for shipment, being of iron.

This is a capital arrangement, and is an evidence that there are some progressive minds in England, notwithstanding the great mass of fogyistic notions entertained by the officers of the Army and Navy.

If the Hon. Secretary of the Navy would improve upon this idea, let him build two or three of these gun-boats; but with better dimensions than those of the East India Company, and with a light grating deck made in hatches, so as to be raised or lowered at pleasure, and provided with a tarpauling cover, and with *Commander Dahlgren's boat armament*, the best in the world. If the *Minnesota* had two or three such gun boats on board, in sections, her officers need not be entirely excluded from the important operations of China. Each one could be hoisted out in sections, and being slung from spars through the gun-deck ports, could be put together in two hours, and in a few more would be ready for service. The sections might be carried like boats, hung by davitts on the quarter, or in the waist of the ship, above the hammock rails.

TONNAGE OF MAIL STEAMERS.

There is an effort being made to secure an Act of Congress which will confine the carriage of the ocean mails to steamers of not less than 2000 tons. We have no fears of the passage of such a law—the proposition is too ridiculous to be entertained by any legislative body. We ask this commercial community, the travelling public, and the country at large, whether the mails of the Government are of more value than the lives of passengers, who take passage in the same steamer? What is the ground of objection? Why, simply this—the mail steam lines are composed of large steamers; and *as they are constructed on the non-paying principle*, some fears are entertained, lest a paying line should be established, which would be adapted to the service required. This size is now being pretty generally known to be less than 2000 tons, hence the opposition. The public will appreciate this effort, on the part of Steamship Companies, to drive the mail and passenger transit into foreign lines, unless they, themselves, can control it. It is a demonstrated fact, that no more mail steamers will be built on this expensive, non-paying principle, almost double the tonnage the service demands.

Fearing that such a monstrous proposition might fail in securing a passage through Congress, a clamor is raised against small steamers, as being unsafe for navigating the boisterous Atlantic. Now all such as oppose the construction of small steamers, of about 1400 to 1600 tons, for passenger and mail transit, should remember that it is but a few years since vessels of 800 to 1000 tons carried the mails and passengers with a smaller per centage of shipwreck and loss of life, than has been experienced since large steamers have been the order of the day. There are yet many persons in this commercial country who can remember how regularly and successfully the *Great Western* made her trips across the Atlantic, a steamer of about 1250 tons. It is too late to ignore small steamers for mail service, because of their being unsafe; all past experience has proved that they have been more free from disasters than the larger class. It is a notorious truth that they are much stronger than larger vessels, as now constructed.

Do not the agents and owners of mail steamers know that *the fastest steamers will carry not only the passengers, but the letters?* It matters not what line may carry the empty letter bags. There is no law, nor can Congress make one, compelling a merchant to send his letters by a certain line, because that line has a contract for carrying the mail. If the merchant pays the Government the full rate of postage, he can send his letter by an express line, in advance of the mail: and who does not see that if the Government contracts with these ill adapted freighting vessels, to carry the mail, that express lines will be gotten up, whose average passage will not exceed nine days, which will drive off these slow coaches, or compel them to give up the mail bags. Express mails will pay better than U. S. mails, if but one day faster.

THE RUDDER QUESTION TURNED UP AGAIN.

It will be remembered by the readers of this journal, that, about two years ago, we published two communications from a correspondent, upon the most efficient locality for rudders, whether at the bow or stern. These communications were without name or address, and purported [illegible] an exposition of "facts," in connection with which, a new theory was sought to be inducted. Our judgment admonished us at the time, [illegible] should be some accompanying demonstration of verity and [illegible] with this array of uproven "facts;" but our kin[illegible] ascendancy, and we published the communicatio[illegible] by our [illegible]tures, to draw out the writer, and thereby serve th[illegible] science; [illegible] however desirable such an end, we failed to bring out [illegible]whole story; b[illegible]

second communication, intended as a reply, was as dark as the first; and we were compelled, *after having once opened our Journal, either to conquer a peace, or bring the writer from his covert, with his budget of disputed facts.* We heard no more of the matter, and had forgotten the subject, when lo! he now turns up again.

Mr. Editor:—You will doubtless be surprised at receiving this communication, especially when it is known to be a reply to the strictures upon my communication, published some eighteen months ago. The explanation for this delay is simply this: I was not aware of the publication of my second communication, till a day or two since! When I sent that communication, I deputed a young man to examine the Magazine, and report when it appeared; and he reported "not in," and the next month the same, and the next. I expressed surprise that no notice was taken of it, and thought of writing, to know if it reached its destination safely, or ask for the manuscript, if it was refused insertion; but I did not, and the matter was forgotten; but during the past week I had occasion to refer to the volume of 1856, and my attention was arrested by three engravings representing the sterns of vessels—in the August number—and in reading the accompanying remarks, became aware, for the first time, that my second communication had been published, and subjected to such a criticism, that I deem it necessary to reply, even at this late date—and especially as I am represented as substantiating a theory, the very oppposite of that which I did support, and at variance with the facts I obtained in my experiments, and also directly opposed to my explicit averments. Such being the case, my self-respect impels me to rid myself of the pile of stupidity that is heaped upon me in those strictures, and show, if I can, that a good portion of it attaches, as I conceive, to you; or, to soften it down somewhat, if I have given unmistakable evidence of a deficiency of acuteness, you have, at least, given evidence of obtuseness.

In my first communication, I distinctly and emphatically asserted, that I submitted a *counter fact* (*a*) to that of the best informed nautical mechanics, which was, "that the anterior part of a vessel was by far the *least* sensitive, and consequently the *least* effective locality; in other words, the vessel may be managed with *less* area of rudder on the *stern* on the bow." I further stated *how* the fact was obtained, and that *philosophy* led me to believe that a vessel *was equally* effective at at the stern;" but the *fact* that *it was not*, was too "stubborn" philosophy, and hence was compelled to fight *for a* new ld square with the fact.

upon the supposition that I experimented with

a vessel with *two* heads and *two* sterns. Now, sir, this looks very much like special pleading; for, as I showed, in my second communication, the *number* of heads and sterns did not, could not affect the result, nor change the fact, one iota; as well assert that the law or rule which applies to 1 and 1 ceases when it is 2 and 2. (*b*) There appears an evident desire to shirk the real issue—to ignore an important point, and institute a fictitious, or side-issue, and give it such importance as to divert attention from the true ground of antagonism. You dispatched the *philosophy* of that fact by calling it "false premises." (*c*) Now, I would ask any one to examine the diagram, which was given expressly to illustrate that philosophy, and nothing else, and see whether it does not point, *unmistakably*, to such a result as I obtained. It is obvious to any one, that a rudder's effectiveness will be less, where it has to force the vessel against a stream or current, or their equivalents, at angles varying from 30° to 45°, than where its effort is against a current varying from 5° to 15°, according to circumstances.

In my second communication, I complained of this hasty disposition of my fact and philosophy, and thought they required different treatment, and asked for a counter-fact and *its* philosophy, to convince me that I had been thoroughly mistaken in my experiments. To this question you remark: "The writer would have us produce *facts* in confirmation of what we have said. To show his faults in such a manner as to make them self-evident, and make the subject comprehensive to an ordinary mind, must suffice for us." This was all I desired, all I asked; but was it furnished? No! Instead of confining your remarks to the *real* and *explained* point, viz., that a vessel was "most" or "least" sensitive at the stern or bow, you ignore the fact, on a *new* ground, viz., that I experimented with a *sailing* vessel, while you "had assumed it had been on a ferry-boat." (*d*) If there is not evidence of obtuseness here, then it is wilful misunderstanding. First it is ignored because the vessel had *two* heads and sterns; but when I asserted that she had only *one*, then it is repudiated because I had a sailing vessel, and consequently altogeter unfit for the service; although, while laboring to prove its inadaptability, you unknowingly conceded my position, even on a sailing vessel, by showing that "the lee lines of flotation favor the rudder at the stern," (*e*) which evidently shows that the rudder has, from its position, an advantage over one on the bow. Yes, a sailing vessel is fully competent to decide the merits or demerits of our positions. But, as it is necessary for me to note further the points between us, I will only remark, that a sailing vessel's propelling power, to be most efficient, must be *nearly balanced*—to put sails on the stern or bow, that need the rudder's force to counteract, is anything but scientific. I hold, therefore, that, had my experiments been so conducted, it would not have

been an evidence of dementia.

What does the following evince, in view of what I asserted in my first communication, and *re-asserted* in my second, viz., that a vessel *was* most sensitive at the stern?" "It appears, by his own showing, that, although he set out to test the best position for the rudder of a vessel, he neither determined that, nor yet anything else of value to himself or the commercial world, and leaves the matter with us, to find out what he did do, for he has not told us. I *have not* told you? Well, well! Dementia, where art thou? My first is considered ambiguous, my second is ambiguity ambigufied. If such is the case, what must we say of the above? That is *not* ambiguous; it asserts that I *did not say* what I evidently *did repeatedly say*.

You further remark: "We showed, in the course of our remarks, that rudders would be more effective on the bow than on the stern," but being more liable to damage on the bow, were put on the stern, on that account, and that "our friend, instead of disproving our position, has only confirmed it." Verily, this is saying a good deal, when there is nothing to prove the assertion. Especially when, just before, you have distinctly asserted that I set out to prove a certain point, but "neither proved that *nor anything* else." But you did not show, satisfactorily, that the rudders were more effective on the bow; *you only attempted* to do so, but signally failed. And further, I could not have confirmed you in your position, because the *facts* and philosophies are thoroughly opposed to it; and neither one nor the other have you been able to gainsay or overthrow. (*f*)

So much for the main point. Let us now consider the secondary point, viz., that one of the reasons why my fact is not reliable, is that "I hung my rudder to the wrong edge."

In my second communication, I stated that the diagram, in my first, was given to illustrate the philosophy, that the stern was the most sensitive, and not to show *how* I hung my rudders; for, as before stated, I hung them differently, by the fore edge, and at three sevenths forward, and by the after edge, and at three sevenths aft. But you make a very important point, as to the hanging the rudder on the stem; now *I* do not. And, as I observed before, "I thought it would be a difficult matter to show the difference between the action of a rudder whose axis is at the stem, or one whose axis is at its fore-edge. You have *tried;* but you have failed to convince, because you did not show the difference between *dragging* a certain quantity of water, and pushing, or driving it. If you are able to do that, then you will be able to overcome the difficulty; till then, you must utterly fail. [illegible]: "If the rudder was hung at the stem, there would [illegible] the weather side; the lee side would,

with the lee bow, form a reservoir, to hold rather than give direction to the water formed." This seems rather ambignous. Surely you must know that *there never is, nor can be*, more than one effective side to a rudder. What possible direction can the lee side of a rudder give to the passing fluid? Why, all rudders drag water after them. Is that giving direction to it? It is a direction, truly, but a wrong and injurious one.

You ask a question about a ship's topsail, which you believe I shall probably admit. Not knowing exactly how much the admission would be supposed to embrace, I must withhold my assent, although a dissenting position would involve some hair-splitting, and I am not in possession of sufficient data, if I were able, to go thoroughly into its merits. Suffice it, then, that I regard *both* leaches, under their ordinary presentment, of very little value, so far as propulsion is concerned. The fore leach is at too acute, and the after leach at too obtuse angles, to be of great service. Few captains, comparatively, spread their canvass to the best advantage; if they did so spread it, there would be little or no difference in the fore and after leaches of sails.

You further remark, upon the subject of wide rudders, that, "dividing a rudder made it more effective, and perfectly manageable," and in confirmation of these facts, certificates, from those who witnessed the operations thus made, were offered in proof. Now I never called in question the fact of the effectiveness of the rudder alluded to; I only maintained that the effectiveness *was not* because it was divided, but because a *larger* surface could be controlled, and thus become more effective. Indeed, in the August number, *you almost repudiate* the idea that dividing rudders increases their efficiency. You have adduced only *one* fact that seemed to militate against the position, that the larger the rudder, the greater its efficiency, if controllable; and that one had *hollow sides*, I explained the why and wherefore of its efficiency, and you did not attempt to gainsay that reasoning. Was it conclusive? (*g*)

In the August number, you further observe, that "the effort of a rudder may be measured by the power applied at the wheel; and that "a wide rudder and a narrow one will have the same effect to steer the vessel," provided the angles vary in the ratio of increase of size. Now I apprehend that both these statemements require qualifying.

First: that the tiller, or wheel would indicate, not only all the *pressure* on *its effective side*, but also all the *suction* on its *non-effective*, or after side, which is known to be considerable, when the rudder approaches large angles, or 45° to the keel—as witness the rushing of the v
half-formed vacuum, occasioned by the rapid movement
through the fluid at a different angle to that which its su

Secondly: A wide rudder, having the same effect up

less angle than a narrow one, must necessarily move more in accordance with its surface, and consequently have *less suction*, or dead water; and as a matter of course, becomes more effective, without any evidence being obtained of that fact, by the leverage at the wheel. If these positions are well taken, then it becomes self-evident that wide rudders are at a premium, especially in difficult navigation, or when danger threatens, such as collisions, or a lee shore. For the *whole* effectiveness of a rudder need not be used, except in cases of necessity. The only object sought in ordinary cases, is to secure the action of the sails before the power of the rudder is spent: and the less the angle that is required by the rudder to accomplish this the better. Because her movements in staying are often more favorable to her destination than when under the full power of her canvas.

To illustrate: Let us suppose, for instance, that a vessel is hauling off a lee shore, but is necessitated to wear or stay, to accomplish the object; but being under short stay, her propelling power is very limited, and hence her movements slow. To facilitate her movements, she is usually kept away somewhat; but this keeping away does not improve the matter but little, for she has further to sail on that account. To wear ship on a lee shore is a dangerous expedient; to stay her, a difficult and often questionable proceeding, in heavy weather; but either must be done. We will suppose her rudder capable of bringing her into the required position, to enable her sails to finish what the rudder began, in one hundred fathoms; but her propelling power will not carry her more than seventy-five; consequently she gets into what is technically called "irons," and possibly, before the irons are well off, she is well on: or if not, she is so much nearer the shore, that wearing may now be impossible, and staying impossible. Now all this might have been avoided, if she had had been provided with a rudder one quarter more effective; for then she would have accomplished her task; but being without it, we must consider her lost, or escaped by the veriest chance.

Allow me to make an important suggestion, viz., that you devote a portion of your Magazine to the illumination of a matter which appears generally neglected by nautical men, either from total ignorance of the principles pertaining thereto, or a wilful disregard of them, but I rather think the former, viz.: the *true method* of setting sails; so that the greatest possible amount of service may be obtained from any given area of canvass spread. I am surprised and annoyed every day at the sight of ... tive violations of the laws or principles which govern this mat... arly useless for naval architects to devote their untiring ... tain the best forms for vessels, while those to whom they ... mit their reputation, as well as their vessels, are in-

different to an equally important point, that of rightly adjusting their propelling power.

Captains may become indignant at these charges, and utterly repudiate them; but the truthfulness of the charge is patent to every one who has given any attention to the subject, and compared the different angles which the sails, on the same vessel, present; to say nothing of the concave surfaces which they offer, for the wind's action. If the sails are not adapted for the purpose for which they were made, the captains have the remedy in their hands; for a knowledge of the need is parent of the supply. If a captain *knows* what he needs, and cannot get it of one party, try a second or third; that will stimulate those who are imperfect in their profession, to higher aims, and the result will be, general improvement. I again say, let captains *learn what they want*, and those mechanics *who cannot learn how to supply it*, will soon give place to those *who can*.

Still yours for improvement, R. W.

BROOKLYN, E. D.

NOTES.—(*a*) But did not furnish the proof.

(*b*) The writer asserts it, but does not furnish the proof. The law of proportion has been demonstrated, therefore cannot be objected to.

(*c*) Are not those "premises false," which assume that things are so, because they are so, without stating in connection, the circumstances under which they were so and so?

(*d*) He did not tell us what it was; we were left to assume. Why does he not tell us what it was, if he knows?

(*e*) We deny that the diagram does prove the stern to be the best position, or that the inequality of the form of the two lines of flotation, the weather and lee lines, favor the rudder at the stern, as his experiments will show, when he can show what they were. A sailing vessel is not competent to determine the best position of the rudder, even though the sail were well balanced.

(*f*) There are some truths in the material world, which require no proof, being self-evident. But new "facts and new philosophies" are not of this class.

(*g*) No, very far from it. It was a "fact" which we had proved twenty-five years ago, by putting hollow sided rudders on Mississippi steamboats, that were unmanageable with rudders having the tapered siding, and the why and wherefore we had given to the world at different intervals since that period. Verily, it looked so much like our own thunder, that, had we replied, we should have charged the writer with plagiarism.

QUERY.—If it requires eighteen months to tell what he did not do, how long will it require to tell what he did do? What possible good can result from withholding the data of the experiment referred to?

ATLANTIC STEAMSHIP PERFORMANCES FOR THE YEAR 1857.

THE importance of tabulated data of the performances of the various lines of steamships, has induced us to give place to the following, prepared from the New York *Herald:*

During the past year, the number of steamships running to this port, from Europe, have been increased by the addition of several new lines, and nearly a semi-weekly commuuicaiion has been kept up between the two shores of the Atlantic. If the rapid increase of steam vessels continues, ere long we shall have a daily line between the two continents.

The Collins line, during the past year, has added to it the steamer *Adriatic*, which has made one voyage.

The Cunard steamers, including those running to Boston, have continued to run regularly.

The new steamer *Vanderbilt* commenced running between this port and Havre, in May last, and made five voyages terminating on the 26th of November last, since which time she has been laid up.

One screw steamship, the *Tempest*, has been lost in the past year. She came from Glasgow to this port, where she arrived on the 1st of February, and sailed again on the 12th of that month, on her return, since which time nothing has been heard of her.

The Liverpool and Philadelphia line of screw steamships, composed of the *City of Baltimore*, *City of Washington*, *City of Manchester*, and *Kangaroo*, which ran regularly between those two ports during the year 1856, have been running between Liverpool and this port with regularity and success during the year past. They have carried more passengers than any other two lines combined. But one of them, the *Kangaroo*, went to Philadelphia, the past year, where she arrived on the first of January, and sailed again on the 10th of February, after being detained about two weeks by the ice. The *City of Manchester* left Liverpool on the 14th of January, for Philadelphia, but after getting to the Capes of the Delaware, she found it impossible to enter, owing to the ice, and was compelled to come to this city. Since that time the whole line has been running to this port.

After the steamer *Ericsson* was withdrawn from the Collins line, she made one voyage to Bremen direct. She left this port on the 16th of Sept., and returned again on the 4th of Nov.

A Bremen steamer, named the *Hansa*, arrived here, from Bremen, di- the 2d of may, sailed again on the 7th, and arrived at Bremen on brought over upwards of 500 passengers, and took back ne been withdrawn from the route.

The Antwerp line, composed of the *Leopold* 1st, *Belgique*, and *Constitution*, after having made seven voyages to this port, were withdrawn from the line, having been chartered by the British government to convey troops to India.

A new line of screw steamers, to run between Bremen, London, and New York, commenced in April last. They were named the *Queen of the South*, *Argo*, and *Jason*. This line was in successful operation until it was chartered by the British government, for the conveyance of troops, etc., to India.

The old Bremen line of steamers, formed by the *Washington* and *Hermann*, and which has not been in operation for about ten years past, ceased to exist on the arrival of the *Washington*, in July last, the contract for carrying the mails having been given to Commodore Vanderbilt.

The steamers running between Portland and Liverpool, via St. Johns, N. F., and Halifax, have made but a few voyages during the year. The Liverpool and Quebec line, consisting of the *Indian*, *Canadian*, *North American*, and *Anglo Saxon*, have been running to Portland the greater part of the year. The number of passengers by these steamers has been few in comparison with those who have patronized the lines of screw steamers coming to this port.

The French line of screw steamers having been formed for the purpose of running between Havre, Martinique, and New Orleans, made but two or three voyages in the beginning of the year, and then ceased running altogether.

The Collins line has suspended its regular trips since the commencement of the year; whether because of the non-payment of the moneys due from the Government, for mail service, as has been announced, or, as is alleged, to rid herself of the services of the present agent, Mr. E. K. Collins, is not certainly known; but the fact that the line is in the hands of the Sheriff, would seem to be a sufficient reason for the suspension of its trips. The *Vanderbilt* has also suspended her trips since the commencement of the year, for the purpose of improving her condition, in order that she may be made more fully sea-worthy—the Commodore having learned, by experience, that, to make sure of a strong vessel, it does not necessarily follow that she must be very large.

The following tables show the number of passages made by each steamer, both eastern and western, as well as the time occupied by each of the Collins and Cunard lines, and of the Steamship *Vanderbilt*, during the year. The time of the other ste[illegible] in round numbers.

COLLINS STEAMERS.

EASTERN PASSAGES.

Names.	*Left New York.*		*D*	*H*	*M*
Ericsson	Dec.	6	13	08	15
Atlantic	Dec.	20	11	23	51
Baltic	Jan.	3	13	18	00
Ericsson	Jan.	17	15	01	00
Atlantic	Feb.	1	11	17	00
Ericsson	March	14	14	10	00
Ericsson	May	9	13	—	—
Columbia	June	6	11	18	00
Atlantic	June	20	11	00	00
Ericsson	July	4	13	04	20
Columbia	July	18	10	23	00
Atlantic	Aug.	1	10	13	00
Baltic	Aug.	16	11	11	00
Atlantic	Sept.	12	10	11	00
Baltic	Sept.	26	9	23	00
Atlantic	Oct.	27	11	01	00
Baltic	Nov.	7	10	22	30
Adriatic*	Nov.	23	11	02	10
Atlantic	Dec.	5			

* The Adriatic arrived at Point Lynas, Dec. 3, 8 P. M., and anchored until 12 M. next day, when she proceeded up. Owing to the heating of the journals, the engines were stopped for 27 hours on the passage.

WESTERN PASSAGES.

Names.	*Left Liverpool.*		*D*	*H*	*M*
Ericsson	Dec.	25	19	00	00
Atlantic	Jan.	7	16	01	00
Baltic	Jan.	21	15	02	00
Ericsson	Feb.	4	20	21	00
Atlantic	Feb.	18	15	05	00
Ericsson	April	1	13	11	30
Ericsson	May	27	14	03	30
Columbia	June	24	11	12	00
Atlantic	July	8	11	05	00
Ericsson	July	22	15	00	00
Columbia	Aug.	5	11	19	00
Atlantic	Aug.	19	10	15	00
Baltic*	Sept.	2	12	03	45
Atlantic	Sept.	30	11	18	00
Baltic	Oct.	14	10	22	00
Atlantic	Nov.	11	11	01	00
Baltic	Nov.	25	11	20	00
Adriatic†	Dec.	9	11	17	40

* Detained at bar four hours.

† During the passage, the engines of the Adriatic were stopped for 33 hours, in order to cool the journals.

CUNARD STEAMERS.

EASTERN PASSAGES.

Name.	*Left New York*		*D*	*H*	*M*
Persia	Dec.	10	9	17	00
Africa	Dec.	24	11	06	30
Europa	Jan.	7	11	01	00
Asia	Jan.	21	12	09	00
Persia	Feb.	4	9	12	00
Africa	Feb.	18	12	05	30
Asia	March	4	12	04	00
Persia	March	18	10	10	00
Africa	April	1	11	00	00
Asia	April	15	12	08	30
Arabia	April	29	11	02	00
Africa	May	13	11	05	00
Asia	May	27	12	04	00
Arabia	June	10	10	20	00
Canada	June	24	12	02	00
Persia	July	8	9	08	20
Arabia	July	22	10	16	30
Asia	Aug.	5	10	20	00
Persia	Aug.	19	9	17	00
Arabia	Sept.	2	11	00	00
Asia	Sept.	16	10	23	00
Persia	Sept.	30	9	17	30
Arabia	Oct.	14	11	08	00
Asia	Oct.	28	11	18	00
Persia	Nov.	11	9	22	00
Arabia	Nov.	25	11	06	00

WESTERN PASSAGES.

Name.	*Left Liverpool.*		*D*	*H*	*M*
Asia	Dec.	27	15	23	00
Persia	Jan.	10	14	02	00
Africa	Jan.	24	13	07	00
Asia	Feb.	7	14	23	00
Persia	Feb.	21	13	03	30
Africa	March	7	17	01	00
Asia	March	21	13	14	00
Arabia	April	4	11	20	00
Africa	April	18	12	23	30
Asia	May	2	12	16	00
Arabia	May	16	12	08	00
Canada	May	30	11	18	30
Persia	June	13	9	16	45
Arabia	June	27	10	07	30
Asia	July	11	13	06	30
Persia	July	25	10	20	10
Arabia	Aug.	8	11	05	30
Asia	Aug.	22	11	18	00
Persia	Sept.	5	9	21	00
Arabia	Sept.	19	12	22	00
Asia	Oct.	3	13	18	00
Persia	Oct.	17	11	02	00
Arabia	Oct.	31	13	00	00
Africa	Nov.	14	12	13	00
Europa	Nov.	28	15	16	00
Persia	Dec.	12	12	17	00

CUNARD STEAMERS—BOSTON BRANCH.

EASTERN PASSAGES.

Name.	*Left Boston.*		*D*	*H*
Arabia	Dec.	17	10	22
Canada	Dec.	31	13	—
Niagara	Jan.	14	12	14
America	Jan.	29	13	—
Arabia	Feb.	11	10	—
Europa	Feb.	25	10	—
Niagara	March	11	12	06
America	March	25	12	—
Europa	April	8	12	—
Niagara	April	22	11	18
America	May	6	11	—
Europa	May	20	11	—
Niagara	June	3	11	04
America	June	17	11	—
Europa	July	1	10	—
Niagara	July	15	11	—
America	July	29	11	15
Europa	Aug.	12	10	15
Canada	Aug.	26	10	—
America	Sept.	9	11	—
Europa	Sept.	23	10	—
Canada	Oct.	7	11	—
Niagara	Oct.	21	11	—
Europa	Nov.	4	12	—
Canada	Nov.	18	11	—
Niagara	Dec.	2	12	—

WESTERN PASSAGES.

Name.	*Left Liverpool.*		*D*	*H*
Niagara	Dec.	20	12	20
America	Jan.	3	17	23
Arabia	Jan.	17	13	08
Europa	Jan.	31	15	00
Niagara	Feb.	14	15	18
America	Feb.	28	14	03
Europa	March	14	15	00
Niagara	March	28	14	00
America	April	11	13	22
Europa	April	25	11	15
Niagara	May	9	11	10
America	May	23	11	10
Europa	June	6	11	05
Niagara	June	20	10	19
America	July	4	13	05
Europa	July	18	12	21
Canada	Aug.	1	11	18
America	Aug.	15	11	23
Europa	Aug.	29		
Canada	Sept.	12		
Niagara	Sept.	26		
Europa	Oct.	10		
Canada	Oct.	24		
Niagara	Nov.	7		
America	Nov.	21	12	
Canada	Dec.	5		

LIVERPOOL SCREW STEAMERS.

EASTERN PASSAGES.

Name.	*Left New York.*		*D*
City of Washington	Feb.	1	11
City of Manchester	Feb.	12	14
City of Baltimore	Feb.	19	12
City of Washington	March	10	13
Kangaroo	March	19	13
City of Baltimore	April	2	12
City of Manchester	April	16	20
City of Washington	April	30	13
Kangaroo	May	14	13
City of Manchester	May	28	14
City of Washington	June	11	12
Kangaroo	June	25	14
City of Baltimore	July	9	12
City of Washington	July	23	13
Kangaroo	Aug.	6	14
City of Baltimore	Aug.	20	13
City of Washington	Sept.	3	13
Kangaroo	Sept.	17	12
City of Baltimore	Oct.	1	14
City of Washington	Oct.	15	12
Kangaroo	Oct.	29	13
City of Baltimore	Nov.	12	13
City of Washington	Nov.	26	12

WESTERN PASSAGES.

Name.	*Left Liverpool*		*D.*
City of Washington	Dec.	31	17
City of Manchester	Jan.	14	19
City of Baltimore	Jan.	28	15
City of Washington	Feb.	14	17
Kangaroo	Feb.	25	15
City of Baltimore	March	11	16
City of Manchester	March	25	16
City of Washington	April	8	13
Kangaroo	April	22	13
City of Manchester	May	6	14
City of Washington	May	20	13
City of Baltimore	June	17	11
City of Washington	July	1	13
Kangaroo	July	15	15
City of Baltimore	July	29	13
City of Washington	Aug.	12	12
Kangaroo	Aug.	26	12
[illegible] of Baltimore	Sept.	9	13
[illegible] Washington	Sept.	23	13
[illegible]	Oct.	7	15
[illegible]	Oct.	21	14
[illegible]	Nov.	4	12
[illegible]	Nov.	18	13

HAVRE STEAMERS.

EASTERN PASSAGES.

Names.	Left New York.	D
Arago	Dec. 18	13
Arago	Feb. 7	13
Fulton	March 7	13
Arago	April 4	13
Fulton	May 2	12
Arago	May 30	12
Fulton	June 27	12
Arago	July 25	12
Fulton	Aug. 22	12
Arago	Sept. 19	12
Fulton	Oct. 17	12
Arago	Nov. 14	13

WESTERN PASSAGES.

Names.	Left Southampton.	D
Arago	Jan. 15	13
Arago	March 11	16
Fulton	April 8	12
Arago	May 6	12
Fulton	June 3	13
Arago	July 1	12
Fulton	July 29	12
Arago	Aug. 26	11
Fulton	Sept. 23	13
Arago	Oct. 21	13
Fulton	Nov. 18	13
Arago	Dec. 16	14

CUNARD HAVRE LINE.

EASTERN PASSAGES.

Name.	Left New York.	D
Emeu*	Jan. 25	12
Alps	Feb. 14	12
Emeu	March 19	12
Alps	April 11	13
Lebanon	July 16	14

* The Emeu went to Liverpool from N. Y.

WESTERN PASSAGES.

Name.	Left Havre.	D
Emeu	Dec. 28	13
Alps	Jan. 25	13
Emeu	Feb. 22	16
Alps*	March 4	15
Lebanon	June 23	12

* The Alps came from Liverpool and stopped at Boston, where she arrived March 20, and sailed 23d · arrived 25th at New York.

VANDERBILT'S HAVRE LINE.

EASTERN PASSAGES.

Name.	Left New York.	D	H	M
Vanderbilt	May 5	10	02	15
Vanderbilt	June 20	9	22	00
Vanderbilt*	Aug. 1	9	13	00
Vanderbilt†	Sept. 12	9	15	00
Vanderbilt	Oct. 24	11	15	50
Total time		50	20	05
Average time of 5 eastern passages		10	04	01
Deduct over-distance as compared with Liverpool, 7 hours, and difference of longitude, 5 hours		—	12	00
Average mean time of each passage, as compared with Liverpool		9	16	00

* The above passage of the Vanderbilt is equal to 9 days and 1 hour to Liverpool, which is 30 minutes shorter than the Persia's fastest time.

† During this passage the Vanderbilt logged 336 knots per day for 7 successive days, or 14 knots per hour.

WESTERN PASSAGES.

Name.	Left Cowes	D	H	M
Vanderbilt	June 8	10	20	00
Vanderbilt	July 8	10	14	00
Vanderbilt	Aug. 23	10	10	25
Vanderbilt	Oct. 3	11	08	15
Vanderbilt	Nov. 15	11	04	20
Total Time		54	09	00
Average time of 5 western passages		10	21	00
Deduct over-distance, as compared with Liverpool, 7 hours		10	14	00
Average mean time of 5 western passages, including 5 hours for difference of longitude		10	19	00

FRANCO-AMERICAN HAVRE LINE.

WESTERN PASSAGES.

Name.	Left Havre.	D
Vigo	Jan. 10	18
Cadiz*	Feb. 9	17

* The Cadiz touched at Liverpool.

EASTERN PASSAGES.

Name.	Left New York	D
Vigo	Feb. 16	14
Cadiz	March 18	14

(To be Continued.)

REPORT ON CRUISE OF ORDNANCE SHIP PLYMOUTH.

BY J. A. DAHLGREN, U. S. N.

Extracted from Documents accompanying President's Message, 1857.

U. S. Ordnance Ship Plymouth,
Washington, Nov. 20, 1857.

Sir:—I have had the honor to acquaint you with the arrival of this ship in the United States, and also of having, in course of the cruise, touched at Fayal, Lisbon, Amsterdam, and Southampton, in pursuance of your orders. Want of time prevented me from using the permission given to visit other ports of England and France.

The *Plymouth*, as directed by your orders, received 23d June, left Washington the following day, and put to sea, after completing necessary supplies from the Norfolk navy yard. The ship has been absent 134 days, and was 34 days of that time in the ports above named.

The operations of a vessel employed on a duty to which the *Plymouth* has been assigned, would include a great variety of objects, but the shortness of the cruising season unavoidably restricted my attention to such issues as were alone determinable by sea practice, and which, from their importance, demanded the earliest consideration.

Of these, none are of more consequence than that which has for its object to ascertain the calibres and weights of ordnance best fitted to give the greatest power to the broadside, for no error in this, the fundamental principle, could be compensated by excellence in the mere accessories.

The constant attention which the question receives from the artillerists of other naval powers, indicates the interest they feel in its proper settlement. Having been led to investigate the subject some years since, the results induced me, in 1850, to propose essential changes in our naval batteries, by the substitution of other ordnance, for which purpose I submitted draughts of guns having 9-inch and 11-inch calibres for broadside and pivot.

Commodore Warrington, then chief of the bureau of ordnance, was so favorably impressed as to recommend to the department the casting of some cannon of this description, which were made trial of in 1850, and in subsequent years. The asserted strength of model, the power and accuracy of fire, were fully maintained by the most thorough course of experiment on record, extending through 1850, 1851, 1852, etc.

The often repeated objection, however, to the unweildiness of such ordnance, prevented their even being tested a [illegible] ment of the new screw frigates came under consideratic [illegible] anifest that no power of battery proportionate to th[illegible] could be developed by any of the existing [illegible] 8-inch shell guns.

The bureau then adopted the 9-inch shell gun for the gun decks of these vessels, but unqualifiedly refused the pivot 11-inch designed for the spar-decks, mounting, in lieu thereof, 8-inch of 63, and pivot 10-inch.

And there the matter might have remained for time or accident to decide, so long as the question was limited in its application to our own navy; but other powers have been prompt to follow the example set by the United States, and to improve on it; they have constructed ships yet larger than the *Merrimac* class, and given to them greater speed, and cannon of heavier calibre.

It is, therefore, imperative on us to be well assured that our batteries *are established on a sound basis, and have their due extension.*

The armament of the *Plymouth* was chosen expressly with reference to the attainment of some satisfactory data, whereby it might be ascertained to what extent the weight of the new ordnance diminished or interfered with its efficient management at sea, as well as the discovery of the means best calculated to remove or abate such evil.

The practice in the ordnance ship has afforded good opportunities for some conclusions on the subject.

Besides the customary drill every day that circumstances permitted, there were fired, under various circumstances of wind and sea—

121 shells from the 11-inch pivot gun; and

230 shells from the 9 inch guns in broadside.

The results, in connection with those previously obtained at the experimental battery, lead me to the following general inferences:

1. When the ship has no motion, or but little, and is without inclination, the 9-inch gun can be worked and fired nearly, if not quite as rapidly as the long 32-pdr., or the 8-inch of 63 cwt.—a succession of shells having been discharged from a piece of this description (mounted at the experimental battery, and manned by twelve men, the crew of a 32-pdr.,) at intervals of 40 seconds, a celerity not easily surpassed with a 32-pdr.

2. When there is no motion or inclination of the decks, the working of the 9-inch gun is proportionately retarded, and the celerity of fire diminished; yet, even under the disadvantage of an inclination exceeding 5°, and reaching to 18° at the extreme roll, a well-drilled crew was able to fire three shells at intervals of 65 seconds, and 35 seconds. (General quarters to test the time in which the battery of the *Plymouth* could be brought into action.)

3. When the ship is still, and on an even keel, the 11-inch gun cannot be fired as rapidly as the 9-inch—perhaps no faster than once a minute; but the motion or inclination of the ship that suffices to decrease the quick working of the 9-inch gun is exerted less unfavorably on the 11-inch; so that it is proportionally more controllable under such circumstan-

ces, and in manœuvring can be aimed much more rapidly. On one occasion 13 shells were fired from it, starboard and port, while the two adjoining 9-inch guns, together, only fired 17 shells; the 11-inch gun being also at the disadvantage of having no pivot from one side to the other, when the ship was tacked to keep the target under fire. In this instance the wind was lignt, but the swell considerable, so that the ship rolled 7° to 8°, and pitched 3°—target distant 800 to 1000 yards.

4. No difficulty occurred during the cruise in making the 9-inch and 11-inch guns perfectly secure in the roughest sea. Coming from England, in October and November, a continuance of boisterous weather, occasionally increased to a gale, afforded the most satisfactory evidence in this respect.

On the whole, I have no hesitation in affirming that, as a pivot-gun, the 11-inch is, in every way, as manageable as the 64-pdrs., which have been so long and are now used on board our steamers. And if this be correct, there should be no objection to restoring that part of my plan of armament which assigned a tier of 11-inch guns to the spar decks of the screw frigates, for which, too, there may be a more imperative reason in the fact, that until this be done, the ordnance power of those ships will not only be less than what it should be, but even *inferior to that of some foreign screw frigates of inferior dimensions*. Certainly the present spar deck batteries of the *Merrimac* class are altogether unworthy of being placed there.

It may be observed, with regard to the retarding influence of the ship's inclination on the heavier ordnance, that in general it is reduced to a minimum before going into action, because it is then customary for vessels to diminish their canvass to the least quantity with which the ships can be properly handled. And we may look for a further abatement of the evil, to the introduction of steam, which has become a prime necessity to every ship of war in battle. No more sail will then be spread than will be required to give steadiness to the vessel, and the inclination of the decks will be comparatively inconsiderable.

Again: the opportunities of firing with correct aim are so far delayed by the interposition of smoke, and the constant motion of the ships, that it is hardly probable that the heavy cannon now in question will fail to be prepared when those opportunities offer.

To insure the comparative results just stated with ordnance as heavy as the 9 inch and the 11-inch, more careful drill and intelligent direction are required than with lighter guns; for it is to be understood that, though certainly attainable, more difficulty in doing so will unavoidably be experienced in proportion as the cannon are heavier.

It becomes indispensable, therefore, not to omit the employment of every means that can facilitate the management of the weightier ordnance under all possible circumstances.

And this is suggestive of the next important office that will devolve upon the ordnance ship—*the training of the men who are to handle the guns.* Science may achieve its utmost in perfecting the cannon and their appointments, but if the crews are deficient in skill and practice, better men with inferior means may bear away the palm.

It will be first necessary to procure seamen suitable to receive instruction as gun captains. The importance of their duties in battle can hardly be overvalued; they direct the details under the officers of division, aim the cannon at the mark, and discharge them. They also assist to instruct the gun's crew, which is the more responsible duty with the heavier ordnance, because more perfect accord in the manipulation is necessary, and to attain it the more thorough drill is required in proportion to the greater number of men which the new cannon need.

The operations of this cruise confirm the common experience in regard to the difficulty of obtaining men likely to answer the purpose. The crew of the *Plymouth* were, with few exceptions, all seamen, which is never the case in vessels of war, and being shipped under favorable circumstances, may be accepted as above the average. Yet the number which might be trained into well qualified gun captains is exceedingly limited.

The full influence of the department will probably be indispensable to procure a supply of seamen fitted physically and intellectually to receive instruction. They may be obtained by selections from the receiving ships and ships in commission, as well as by special recruitment, and induced to qualify themselves, by rates, pay, etc. The gunners and gunners' mates should be appointed from them. In short, no incentive omitted that can properly be offered.

The difficulties that attend the undertaking, have arisen, and continue in France and England, but are perseveringly and successfully encountered. Some discouragement has been experienced from the anticipation that many who enter and qualify may subsequently decline to re-enter, which, no doubt, will happen. But so far from viewing this as an objection, or even as a difficulty, I should consider it only as a temporary inconvenience, which had its ulterior advantages in diffusing among our seamen a skill in their peculiar arm, which must eventually tell to the benefit of a maritime power whose avowed policy is, and has been, to recruit its resources in war from the seamen and vessels of the commercial marine.

In England a like result is not left to this accidental source only, but especial efforts are made to train the great mass of those whose business is on the water, and ships with competent officers are provided for the purpose; one of these, a frigate, lay near the *Plymouth*, when at Southampton, and I witnessed the drilling of a number of men, who would remain [illegible] then return to their vocation. It appeared to me a decided

improvement on the "inscription maritime" of France, to which it is probably a counterpart.

No doubt it can be made an object to most of our seamen who qualify as gun captains to continue as such, in the navy, and those who leave may some day render good service in the armed ships of the republic, private or public.

When such ample expenditure is made to train and arm our citizens for the common defence ashore, and one of the best military academies also contributes its quota to the same purpose, by the return of cadets to private life, there seems to be no valid objection to a system which incidentally makes some, though slight provision, for the military training of our citizens afloat.

As a proper system of drill is indispensable to the uniform training of the personnel, my attention has been given to the preparation of a manual adapted to the manipulation of the two-truck carriage of the 9-inch gun, and the pivot carriage of the 11-inch. By the diligence and well-directed efforts of the lieutenants of this ship, this has been so far accomplished, that the settlement of a few minor points, which will be arranged by the winter drill, is alone required to make the work presentable, and to fit it for service.

I am satisfied that the employment of a ship on this duty cannot fail to result in all the advantages which were anticipated, though some time will be necessary to render its operations certain and regular.

Should it be so fortunate as to secure your favorable opinion, I would respectfully beg leave to recommend to your consideration the continuance of the appropriation made at the last session of Congress.

I would also ask to submit a request that a screw corvette might be constructed for this duty. In the course of the practice at sea, no one could fail to remark the unavoidable difficulty of keeping the target within the lateral scope of the guns, by manœuvring with sails only, and how much loss of time was thereby occasioned. The superior efficiency of steam under such circumstances would have been invaluable. Undoubtedly, *no ship of war can be considered complete, which is unfurnished with this motor*, while its assistance would compensate for an inferior number of guns, and in many cases confer an irresistible advantage over an opponent.

The present practice of the great naval powers indicates a remarkable unanimity in this respect, notwithstanding the cost consequent upon the use of steam. No ship of war is now constructed in England without a power of this kind. The official list in 548 vessels comprising the navy of that country, 289 have steam; of 188 vessels in commission, 126 (or two-thirds), are steamers, besides 185 steam gun-boats.

Many important facts, not procurable in any other way, would be obtained if the department would authorize the use of one of the old ships as a target for shell practice. Perhaps there is no better purpose to which some of them could be applied.

The pivot gun, with its carriage, weighs 12½ tons. The large port required to work it is 8 by 4 feet, and its size does not materially detract from the strength of the fabric. Nor does it appear that the repeated shocks of firing so heavy a gun have produced the least effect on the construction.

The *Plymouth* is a creditable ship to the builder.

In conclusion, I ought not to omit bringing to the notice of the department the effective assistance rendered to the work by the earnest and harmonious co-operation of the officers of the ship—Lieut. Jones, as executive officer, Lieut. Balch, as master and ordnance officer, Lieuts. Edwards, Webb, Badger, and Truxton, as officers of division; while the medical officers, Doctors Miller and Vedder, and the purser, Boggs, failed not to contribute their efforts to the common cause, by the satisfactory manner in which the affairs of their respective departments were conducted.

It is with regret, therefore, that I see the approach of the period when, by the usual conditions of service, the relations that have existed between them and myself may be dissolved.

Under the authority to that effect from the department, I took the opportunity of visiting such foreign ordnance and naval establishments as were convenient of access from the ship. The time that could be so used was, however limited, and being reduced still more by the delays unavoidable in obtaining permission from the proper authorities, I was compelled to omit some places altogether, and to be satisfied with a very hasty view of others.

Still, much of interest came under my observation, which was of service in enabling me to compare the present condition and probable prospects of our national marine with those of high repute abroad.

War Ships for Foreign Governments.—Rear-Admiral Mehemmed Pacha and Hussein Bey, sub-surveyor of the Dock-yards of the Ottoman Porte, has been charged with a commission to the United States, to study ...ress of ship-building, and to superintend the construction of a war ...lered by his government.

For the U. S. Nautical Magazine and Naval Journal

TONNAGE OF THE LAKES.

Below will be found a list of the new vessels built at the several American Lake ports during the past year, with the aggregate tonnage and valuation of the same, furnished by the politeness of John J. Henderson, Esq., Secretary of the Buffalo Board of Trade:

The new tonnage added in 1854 was as follows:

Total Steam tonnage	6,448 89	" Brig "	3,930 00
" Propeller "	5,168 47	" Schooner "	19.469 00
" Barque "	5,729 00		
Grand total			40,789 86

In 1855 there were built on the lakes:

3 steamers, tonnage	1.695	2 barques "	776
8 propellers "	4,218	6 brigs "	1,742
4 tugs "	251	105 schooners "	28,752
128 Total			37,429

In 1856 there were built and launched on the lakes, the following:

3 steamers, tonnage	2,000	5 barques "	2,438
22 propellers, "	12,755	1 brig "	434
5 tugs "	895	121 schooners "	34,828
157 Total			53,350

In 1857 the following vessels were built on the lakes:

Class.	*Tonnage.*	*Value.*	*Class.*	*Tonnage.*	*Value.*
5 steamers	4,120	$ 349,500	2 brigs	869	38,200
28 propellers	11 876	811,700	96 schooners	28,642	1,309,100
15 tugs	1,412	159,000	5 scows	415	17,000
3 barques	1,264	50,000			
			149	48,598	$2,743,500

This gives our lake tonnage an increase, in three years, of

11 steamers	7.815 tons	24 tugs	2,557 tons
58 propellers	28,844 "		
Total steam			39,217 "
10 barques	4,478 tons	327 schooners	92,637 "
9 brigs	3,045 "		
Total Sail			100,160 tons
Grand total			139,377 "

The value of this new tonnage is as follows:

Steam tonnage in 1855.....$ 395,000	" " 1857.....	$1,320,200
" " 1856..... 1,132,000		
Total steam		$2,847,200
Sail tonnage in 1855........$1,213,000	" " 1857........	$1,423,300
" " 1856........ 1,604,450		
Total sail		$4,241,650
Grand total.		$7,088,250

Total tonnage on the lakes in the fall of 1857 was 388,868 tons. and the value of the same was $15,195,400.

The following table will show the name, rig, tonnage, and value of American vessels built at the several lake ports during 1857, with the ports at which they were built:

Rig.	*Name.*	*Where Built*	*Tons.*
Steamer	City of Buffalo	Buffalo	2,026
"	City of Cleveland	"	788
"	International	"	1,120
"	Cygnet	"	150
"	Miner	Detroit	36
Total No. Steamers....5.	Tons....4,120	Total value....	$349,500

Rig.	*Name.*	*Where Built.*	*Tons.*
Propeller	Hunter	Buffalo	680
"	La Cross	"	384
"	Dubuque	"	384
"	Burlington	"	384
"	City of Madison	"	360
"	Quincy	"	360
"	Eclipse	"	620
"	Equator	"	620
"	Equinox	"	620
"	Missouri	"	588
"	M. B. Spaulding	"	384
"	Fountain City	Cleveland	800
"	L. L. Lyon	"	188
"	City of Superior	"	578
"	Dacotah	"	698
"	Galena	"	690
"	Comet	"	620
"	Rocket	"	611
"	Mendota	"	709
"	North America	"	397
"	Wenona	"	688
"	Gov. Cushman	"	384
"	George Barber	Milwaukie	157
Total No. Propellers....23	Tons....11,876	Value....	$811,700

Rig	*Name*	*Where Built.*	*Tons*
Steam Tugs	Leviathan	Buffalo	315
"	Stillman Witt	"	127
"	N. P. Sprague	"	173
"	H. P. Clinton	"	67
"	Rapid	"	99
"	H. N. Martin	"	89
"	A. E. Hart	"	65
"	J. B. White	"	30
"	J. Ely	"	25
"	Little Belle	"	10
"	St. Mary	"	20
"	J. Martin	Cleveland	170
"	William Morgan	Oswego	83
"	S. E. Brooks	Erie	64
"	H. Perry, Jr	Oswego	75
Tota No. Steam Tugs 15.	Tons....1,412	Total value	$159,000
Barque	R. G. Winslow	Cleveland	499
"	C. J. Kershaw	"	382
"	D. Morris	Black River	383
Total No. Barques 3	Tons.....1,264	Value	$ 59,000
Brigs	Commerce	Sandusky	445
"	Bay City	"	424
Total No. Brigs 2	Tons....869	Value	$38,200
Schooners	Ethan Allen	Buffalo	339
"	Die Vernon	"	414
"	Warecan	"	371
"	York State	"	398
"	Lone Star	"	383
"	M. F. Johnson	"	287
"	Mary Booth	"	141
"	Comet	"	478
"	Rocket	"	478
"	Comelia	"	359
"	A. E. Hart	"	445
"	Grey Eagle	"	380
"	Sea Bird	"	384
"	G W. Holt	"	381
"	Imperial	"	437
"	Invincible	"	437
"	Dauntless	"	438
"	Europa	"	391
"	Mazeppa	"	391
"	Mary Morton	"	264
"	St. Albans	Cleveland	364
"	Walrus	"	377
"	Belle Walbridge	"	355
"	D. N. Martin	"	465
"	E. M. Peck	"	228
"	H. Barclay	"	389
"	T J. Bronson	"	381
"	G. D. Dousman	"	369
"	Flight	"	249
"	Morning Light	"	331
"	Massilon	"	397
"	Metropolis	"	359
"	M. B. Hale	"	361
"	S. Hi[illegible]		343
"	C[illegible]		371
"	[illegible]		359
"	[illegible]		341
"	[illegible]		

Rig	*Name*	*Where Built.*	*Tons.*
Schooners	Return	Black River	348
"	C. Snell	Richmond	277
"	Mary Collins	Ashtabula	360
"	S. A. Green	Irving	84
"	J. Thursby	"	360
"	Rugby	"	167
"	Jupiter	"	372
"	J. L. Gross	Vermillion	352
"	R. B. Hubbard	Sandusky	136
"	Humboldt	"	108
"	Josephine	Wilson	380
"	Kossuth	Sheboygan	214
"	Minehaha	Oswego	260
"	Monticello	Clayton	380
"	M. McNair	Oswego	226
"	Challenge	Vermillion	247
"	R. Dart	Milwaukie	297
"	Despatch	Oswego	262
"	Dane	Three Mile Bay	361
"	El Tempo	Manitowoc	278
"	Elenor	Two Rivers	278
"	Exchange	Vermillion	376
"	Freedom	Green Bay	52
	B. Franklin	Sodus Point	172
"	B. Blint	Fremont	295
"	H. S. Fairchild	Rochester	378
"	Arrow	Erie	281
"	Eli Bates	"	365
"	W. Barclay	Detroit	69
"	A. Baensch	Manitowoc	195
"	Belle	Trenton	48
"	A. Bradley	Vermillion	251
"	T. Baker	Milan	294
"	Condor	"	225
"	Cape Horn	Huron	267
"	J. Christie	Milwaukee	160
"	W. H. Craig	Milan	390
"	Myrtle	"	248
"	J. Navagh	Oswego	374
"	Oriole	Milan	403
"	Presto	Huron	247
"	Plover	Milan	380
"	Pine Forest	Michigan	183
"	M. A. Rankin	Charlotte	126
"	Radiant	Clayton	235
"	Rival	Alex Bay	331
"	M. M. Scott	Conneaut	342
"	St. Helena	Milan	297
"	Sasco	"	390
"	D. Slawson	Racine.	273
"	Trial	Detroit.	23
"	Typhon	Milan	244
"	Tarry Not	Charlotte	265
"	J. Vilas	Manitowoc	218
"	L. Wells	Vermillion	299
"	George J. Whitney	Charlotte	99
"	J. Weeden	Huron	296
"	W. J. Whaling	Milwaukee	374

Total No. Schooners....96 Tons....28,642 Value....$1,309,100.

Scows.—Ada, Fairport, 109; Cloud, do., 20; Freemason, Black River, 34; Sea [illegible], **Cleveland, 186; E. S. Taylor, Black River,** 116. Total, 5. Tons, 415. Val-[illegible]**7,000.**

THE DANISH SOUND DUES.

We are glad to know that this vexed question has at length been settled, and that this onerous burden upon American commerce has been removed, as the following proclamation of the President will show:

Whereas, a convention between the United States of America, and his Majesty, the King of Denmark, for the discontinuance of the Sound Dues, was concluded and signed by their respective plenipotentiaries at Washington on the eleventh day of April last, which convention is word for word as follows:

The United States of America and his Majesty the King of Denmark, being desirous to terminate amicably the differences which have arisen between them, in regard to the tolls levied by Denmark on American vessels and their cargoes, passing through the Sound and Belts, and commonly called the Sound Dues, have resolved to conclude a convention for that purpose, and have named as their plenipotentiaries, that is to say, the President of the United States, Lewis Cass, Secretary of State of the United States, and his Majesty, the King of Denmark, Torben Bille, Esq., Knight of the Dannebrog, and decorated with the Cross of Honor of the same order, his said Majesty's charge d'affaires near the government of the United States, who, after having communicated to each other their full powers in due form, have agreed to and signed the following articles:

Art. 1.—His Majesty, the King of Denmark, declares entire freedom of the navigation of the Sound and the Belts in favor of American vessels and their cargoes, from and forever after the day when this convention shall go into effect, as hereinafter provided. And it is hereby agreed, that American vessels and their cargoes, after that day, shall not be subject to any charges whatever in passing the Sound or the Belts, or to any detention in the said waters; and both governments will concur, if occasion should require it, in taking measures to prevent abuse of the free flag of the United States by the shipping of other nations which shall not have secured the same freedom and exemption from charges enjoyed by that of the United States.

Art. 2.—His Danish Majesty further engages, that the passages of the Sound and Belts shall continue to be lighted and buoyed, as heretofore, without any charge upon American vessels or their cargoes, on passing the Sound and the Belts, and that the present establishment of Danish pilots in these waters shall continue to be maintained by Denmark. His Danish Majesty agrees to make such additions and improvements in regard to lights, buoys, and pilot establishments in these waters, as circumstances

and the increasing trade of the Baltic may require. He further engages that no charge shall be made, in consequence of such additions and improvements, on American ships and their cargoes passing through the Sound and the Belts. It is understood, however, to be optional for the masters of American vessels either to employ in the said waters, Danish pilots, at reasonable rates, fixed by the Danish government, or to navigate their vessels without such assistance.

Art. 3.—In consideration of the foregoing agreements and stipulation on the part of Denmark, whereby the free and unencumbered navigation of American vessels through the Sound and the Belts is forever secured, the United States agree to pay to the government of Denmark, once for all, the sum of $717,829 rix dolars, or its equivalent, $393,011 in United States currency, at London, on the day when the said convention shall go into full effect, as hereinafterwards provided.

Art. 4.—It is further agreed that any other or further privileges, rights, or advantages, which may have been or may be granted by Denmark, to the commerce and navigation of any other nation at the Sound and Belts, or on her coasts and in her harbors, with reference to the transit by land through Danish territory, of merchandise belonging to the citizens of such nation, shall also be fully extended to, and enjoyed by the citizens of the United States, and by their vessels and property in that quarter.

Art. 5.—The general convention of friendship, commeree, and navigation, concluded between the United States and his Majesty, the King of Denmark, on the 26th of April, 1826, and which was abrogated on the 15th of April, 1856, and the provisions contained in each and all of its articles, the 5th article alone excepted, shall, after the ratification of this present convention, again become binding upon the United States and Denmark, it being, however, understood, that a year's notice shall suffice for the abrogation of the stipulations of the said convention hereby renewed.

Art. 6.—The present convention shall take effect as soon as the laws to carry it into operation shall be p ssed by the governments of the contracting parties, and the sum stipulated to be paid by the United States shall be received by or tendered to Denmark, and for the fulfillment of these purposes a period not exceeding twelve months from the signing of this convention shall be allowed. But if, in the interval, an earlier day shall be fixed upon, and carried into effect, for a free navigation through the Sound and Belts, in favor of any other power or powers, the same shall simultaneously be extended to the vessels of the United States and their cargoes, in anticipation of the payment of the sum stipulated in Art. 3; it being understood, however, that, in that event, the government of the United States shall also pay to that of Denmark four per cent. interest on

the said sum, from the day the said immunity shall have gone into operation, until the principal shall have been paid, as aforesaid.

ART. 7.—The present Convention shall be duly ratified, and the exchange of ratifications shall take place in Washington, within ten months from the date hereof, or sooner, if practicable.

In faith whereof, the respective plenipotentiaries have signed the present convention, in duplicate, and have thereunto affixed their seals.

Done at Washington, this 11th day of April, in the year of our Lord 1857, and of the independence of the United States, the eighty-first.

LEWIS CASS, [SEAL.]
TORBEN BILLE. [SEAL.]

And whereas the said convention has been duly ratified on both parts, and the respective ratifications of the same were exchanged in the City of Washington, on the 12th inst., by Lewis Cass, Secretary of State of the United States, and W. de Raasloff, his Danish Majesty's Charge d'Affaires and Consul-General in the United States, on the part of their respective Governments:

Now, therefore, be it known, that I, James Buchanan, President of the United States of America, have caused the said convention to be made public, to the end that the same and every clause and article thereof may be observed and fulfilled with good faith by the United States and the citizens thereof.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

[SEAL.] Done in the city of Washington, this 13th day of January, in the year of our Lord 1858, and of the independence of the United States, the eighty-second.

JAMES BUCHANAN,

By the President: LEWIS CASS, Secretary of State.

MARINE INSPECTION.

A MOVE has been made in the right direction in reference to the inspection of vessels. The Board of Underwriters, through a Committee, have been urging the passage of a law, requiring, that, within five years after a sea-going vessel is launched, she shall be opened her entire length, by taking off a plank, outside and inside, so that her frame may be carefully examined, to see whether it is sound. The Underwriters state that
quently happens that a vessel, which, to external appear
sound, and which is comparatively new, is, in fact, so

pieces in a moderate gale. This decay, as a general thing, is consequent upon some defect in the timber, which shows itself within five years after the vessel is launched, and if it does not commence within that time, it never does. The object of this proposed law is to secure suitable and thorough inspection of hulls during the first years of their use.

There is another cause for the premature decay complained of by the Underwriters, viz., the want of ventilation. There is not a vessel, within the range of our knowledge or observation, that is properly ventilated. *The acidity of the timber* of which the frames of vessels are, for the most part, composed, being acted upon by the bad air of the vessel's hold, generates caloric in the capillary vessels, passing through the fibre of the wood, and speedy decay is the consequence. There should be a more careful survey of the materials of constructioh, while the vessel is building. How frequently is it that ship-masters are appointed to superintend the construction of vessels, who know comparatively nothing about either timber or iron.

INSTITUTION OF NAVAL ARCHITECTS AND MUSEUM.

A correspondent writing to the London *Artizan*, endeavors to call the attention of the ship-builders of the United Kingdom to the necessity of an Institution for the promotion of knowledge in this much-neglected science. We are glad that there is at least one live Naval Architect in England, who has a proper idea of progression, and who is willing to believe that, by possibility, some one might be found who knew as much as himself, and that, by mutual interchange of thought and experience, a degree of progress might be attained. Such an Institution, in connection with a world's Convention of Marine Architects, would do more for the approximation of perfected science in Marine and Naval Architecture, in the first suceeeding five years of its history, than has been done since the deluge. Such an Institution is needed quite as much, and even more, in the United States, than in England. There should be at least three in the United States. We hope to hear a hearty response, on both sides of the Atlantic. We hope the time is not far distant when there will be a World's Convention of Marine Architects held, either in New York or London. So little is known of this science, that the great mass of commercial men have never yet discovered the difference between, (or distinguishing features of) ...ine Architecture and ship-building. But we will let this live man ... himself;

"I am of opinion that it would be of great benefit to the profession, and to the public generally, that we should possess a museum for the deposition of models and drawings, and institute a Society of Naval Architects, holding periodical meetings, for the purpose of reading papers and discussing thereon—in short, to become to the science of naval architecture what the Institutions of Civil and Mechanical Engineers are to engineering, and the Institution of British Architects is to architecture.

There is a want of union among us professionally, that is detrimental to our own interest, and injurious as regards public safety. There is not that supervision in shipbuilding matters, which is deemed so necessary in the construction or alteration of houses and other buildings—a supervision so necessary and proper where human life is concerned. Before anything can be done in building or altering houses, the sanction of the surveyor must be obtained; but any one is allowed to cut a ship to pieces, rise a new deck upon her, tower her masts to the skies, and so weaken the vessel and destroy her stability, as to jeopardise the lives of three or four hundred people who may be on board. There is no one to say, "That ship is not safe to go to sea; and even if she be insured at Lloyd's, Lloyd's surveyors only demand a certain thickness of wood or iron, and frames of a certain size, placed such and such a distance apart, and they see that the same is properly put together. Now this is all very well, but is not sufficient. They do *not* know whether the vessel is of the right form, or properly masted; neither do they superintend the stowage of vessels, to prevent the dangerous practice some captains have, of putting all heavy goods quite in the bottom of the vessel, thus placing the centre of gravity too low, which is almost as dangerous as if it were placed too high.

Now, if we were to become an incorporated body, such as the Institutions I have named, we could prevent all this. When we had attained a certain standing, the public would support us, and say naval architects are a necessary body, and not think, as they do now, that there is nothing in ship-building, and that engineers, by applying the same principles to ships as they do to bridges and girders, are capable of building a good vessel. It may appear so; but is a vessel constructed on these principles a good ship, as regards form and stability?

In a few months will be completed that master-piece of workmanship, (I do not say naval architecture,) the *Great Eastern.* She is built under the superintendence, and from the designs of one of our greatest *engineers*, and for the sake of the 10,000 troops, or the 4,000 passengers, she is to carry, I trust he has studied that which is necessary to construct a substantial and manageable sea-going vessel. Were we an incorporated body, as I hope we shall be at some time not far distant, the designer of the *Great Eastern* might have first disclosed to us his stupendous idea,

and we could have considered and given our various opinions upon it, and, by gathering from the ideas of those who understand naval architecture, it would then have been certainty as to the capabilities of that vessel. I must beg of my professional brethren to consider my suggestion. The best way to carry out that which I so anxiously desire, (as far as I am competent to judge,) is to establish a yearly exhibition of naval architecture; thus once established, we can easily form a school of naval architecture, similar to that which was abolished by the Admiralty, from reasons never satisfactorily explained.

In conclusion, I would bring under your notice a paragraph which you inserted in the *Artizan*, for March, and which will prove how necessary it is that a school of naval architecture should be established:

"The Belgian steamer *Belgique* has condemned her iron masts as unsafe and unsuitable. Our opinion is, that the hull is as much at fault as the masts. The bow and stern are very heavy and overhanging, and the ship is narrow, in fact, a boiler-maker's model. Better to have paid a competent naval architect for a suitable model, and thus secured a basis for utility and profit. What is such a ship as that of the *Belgique*, but an imposition on the owner and the public, in comparison with a sea-going vessel?—*U. S. Nautical Magazine and Naval Journal.*"

THOMAS SMITH, Naval Architect.

THE ADRIATIC AND THE COLLINS LINE.

(Concluded from page 43.)

THIS vessel, having made but one trip to Liverpool and back, with but little probability of a second, before changing owners. We shall conclude our remarks with more brevity than we had intended. Of the eight boilers, but six have been used at any one time, with a consumption of 90 to 95 tons per day. They have 1,000 square feet of grate surface, and 35,000 square feet of fire surface; the tubes are of iron, 2¼ inches outside diameter, 3½ feet long long, and one-tenth of an inch thick; the number of tubes is 14,400. The air pumps are of a new design, got up by Mr. D. B. Martin, and are 44 inches diameter by 3 feet stroke. They are worked by enormous eccentrics on the main shaft. The engines were not in a condition to be driven up to their full power, on her first trip, which will account for her not making a quicker passage.

She is, without doubt, faster than the *Persia* or the *Vanderbilt*. Her future destiny is unknown. It is said that the Russian Government have

bought her. It is known that they were anxious to secure her. Alas! who would have supposed that we would have been called upon, so soon, to write an obituary notice of the Collins line, and that, too, in connection with the trial trip of one of its steamers. Had the proprietors of this line heeded the counsel given in this journal, during the years 1855 '56, and '57, the Collins line would now have been making money for its owners, not only paying all the expenses, but a fair profit, and paying at least the interest on the $600,000 paid to Congressmen and others, to secure the mail contract. It is to be hoped that such a gross amount of folly will not again be witnessed in this country, and that whoever undertakes to get up an American line of steamers *will consult the draft as well as ledger, the Marine Architect as well as the Captain, the builder as well as the engineer.* Mr. Collins took counsel only from those who wanted fat jobs—the larger the ship, the larger the job. Every man who had independence of thought and action, was avoided; while those who would flatter his pride, were regarded as his best friends; and now he has learned, if never before, that knowledge is not commensurate with experience, in connection with the truth of that maxim, which teaches that "pride goeth before destruction, and a haughty spirit before a fall." In connection with the want of adaptation in the vessels themselves, to the service required, this line has been grossly mismanaged. When the ships needed overhauling, in the winter season, when few passengers were crossing the Atlantic, these vessels were kept going, thus rendering increased repairs necessary, and when the travelling season arrived, then these vessels must, of necessity, be laid up for repairs. (The Cunard line, at the same time, going with well-filled state-rooms.) During the unprofitable season, they were kept going, though out of repair, and the only part of the year when money could be made, then one or more of the line must be laid up for repairs.

SEAMEN'S WAGES.

NEW YORK, March 1, 1858

	Per Month.	*Advance.*
To Liverpool	$15	$20
To London	15	18 to $20
To Havre	15	18 to 20
To North of Europe	15	18 to 20
To the Mediterranean	12	12
To South America	12	12
To West Indies	14	14
To East Indies and California	12	24
Coasting	16	8

THE MARINER'S TELEGRAPH.

FEW indeed there are, of those who live on *terra firma*, that ever think much about another mode of conveying thoughts, besides that of flashing them on wires over land, and under the sea. The advantages of holding converse on the surface of the ocean, has not been overlooked by those who watch over the shipping interests, and care for the perfection of correspondence between those who, for the most part, live on the surface of the lubric wave. That sea-signals are made of flags, it is perhaps hardly necessary for us to say; and that they are made into different shapes, and of various colors, is also very generally known, nor need we remark that their use is of comparatively modern date. The Royal Navy could not boast of a general code of sea-signals, until about the close of the last century. A form of telegraph was introduced into the Royal Navy by Sir Home Popham, in the year 1803, and became the foundation of all subsequent codes. This code of signals was founded on the numerical principle, having a distinct flag to represent each of the ten figures, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9; so that by combinations of these flags, any number, up to 9999, could be expressed. The alphabetical list of letters, together with the words in general use in naval communications, were arranged in a signal book, alphabetically, each word, letter, and sentence, having a special number appropriated to it. It was by this kind of telegraph, that Lord Nelson addressed his fleet in the well-known message signalized at Trafalgar:

253	269	863	261	471	958	220	370	4	21	19	24
England	expects	that	every	man	will	do	his	d	u	t	y

It must be quite apparent that the numerical method has a scope far too limited for general use, and that it must, of necessity, give way before the influence and progress of nautical knowledge, under the light of civilization. This method was abandoned in 1839 by the British Navy, and the letters of the alphabet substituted, having 26 flags, being one for each letter. With these 26 flags, under the light of science, 16,000 distinct signals can be made, and that without displaying more than *three* flags at a single hoist. However incredible this may seem to the casual observer, it is no less strange than true, as a reference to the law and philosophy of permutations will abundantly prove.

The merchant service had no system of signals beyond the well-know signal for a pilot, until the year 1817, when Capt. Marryatt, R. N., pulished the code recognised by his name. In Great Britain this systa-came into general use, while in France it was not adopted without sily modifications, as also in the United States and other countries. The M an-

att code differs but little from that of Sir Home Popham, flags representing figures being the mode of operation. It was not adapted to the increasing wants of commerce, and was the occasion of perplexing difficulties, which were more sensibly felt, as other means of communication advanced towards perfection. In 1855, the Board of Trade of London appointed a commission, consisting of persons connected with the Navy and mercantile marine, to make inquiry, and to report a signal code worthy of universal adoption. The subject was fully discussed, both by the Board of Trade, and subsequently by the commission, without which no radical reform could have been possible. The name of the vessel being the subject of such frequent interchange at sea, gave rise to a full discussion of the subject, when it was found that it was not enough to give the name of the vessel, lest there might be two vessels of the same name, and both hailing from the same port of entry. It was found by the commission, that not only the name of the vessel, and the port to which she belonged, but the number and year of registry must also be given, and without which, the vessel could not be identified with absolute certainty. It is much the same with vessels as with men—John Brown, of New York, does not furnish the positive identity of the person sought; but John Brown, of New York, aged 37 years, son of James Brown, formerly of Boston, will hardly fail to identify the man we seek to find.

It often happens, that, on being sold, ships change their port of registry—perhaps one half of the ships which hail from the port of New York, were built in the Eastern States. On changing their port of entry, they are likely to have a number assigned them, under the old law in England, even a new name, as was formerly the case in the United States, until the law was repealed by the present Congress. We are glad to know that the Merchant Shipping Act of 1854 effectually remedied this evil in England. Under the Marryatt code, it required repeated hoists of a variety of signals to individualise a vessel. It is less difficult in England than formerly, to secure this identity, in another respect; under the Merchant Shipping Act of 1854, every British vessel has two register numbers, in addition to the local number at her port of registry. She has a distinct official number, which must be marked on the side of the vessel's midship beam, which number remains unchanged through all the various changes of ownership she may pass. In the Mercantile Navy List, published annually, by authority, and with the monthly supplements, these official numbers are placed in order against the vessels to which they belong. Under this arrangement of publishing annual shipping sts, it may well be conceived that when an official number is signalised y signals agreed upon, whoever has a copy of the Shipping List, can ow, with certainty, what vessel is meant.

This preliminary matter being settled, and the Merchant Shipping Act having gone into effect the previous year, 1854, the commission above named determined to reject the numeral system of signals, and have recourse to letters. They contrived a code of signals of eighteen flags, all readily distinguishable from each other, by means of shape and color, and each flag is made to represent one of the eighteen consonants of the English alphabet These letters are *not* used to represent *sounds*, but to represent *signs*, to which arbitrary meanings are affixed.

It may be well to inquire, how many distinct signals can be made with these eighteen flags? Single signs not being reckoned, we begin with the pair of flags, B and C. These will form two signals, meaning one thing when B is uppermost, and another when C is uppermost. The same is the case with B and D; and in thus following up the changes on all the possible pairs, any one who has the disposition to try, will find that as many as 306 distinct signals can be formed. By hoisting three flags at a time, instead of two, no fewer than 4,896 different permutations may be obtained; and with a hoist of four flags at a time, these permutations are increased to 73,440; and if it were convenient to use five flags *at once*, as many as 1,028,160 would be obtained. But as it was found practically essential that the signal to be made should be at one hoist, with the flags all in a row, one above another, the use of more than four flags for one signal would be liable to serious objections. It was the necessity for so many flags, or more than one hoist, that was regarded as one of the most objectionable features or faults of the numeral system. By having but one hoist, and confining the grouping of flags (or the letters they symbolize) to two, three, and four flags, the total number of distinct signals afforded is 78,642.

In England, a large proportion of these signals require to be appropriated to telegraphing the official numbers of the ships composing the mercantile navy of Great Britain, with its prospective increase. The present number is 35,000, and with the provision for the increase, and the vacant numbers consequent upon wreck and condemnation, a range of 50,000 numbers must be provided, each having its own distinct signal. These signals for numbers are all composed of four signs, and they have a distinctive character given them, by being so contrived that the uppermost symbol in the hoist is always a square flag.

In the Mercantile Navy List, containing the name and number of every registered vessel, there is joined with the er, its appropriated signal of four letters, corresponding with bers symbolized being arranged successively, and the betically, so that either the number or the letters sig formed; and if the whole mercantile navy of Grea

chor together, and every vessel signalising her number at the same time, each one might be individualized by the four distinguishing flags, composing her special signal. After providing for signalising the numbers of vessels, the system leaves upwards of 20,000 distinct signals for general subjects.

In the "Commercial Code of Signals, for the Use of all Nations," drawn up by the Committee already spoken of, and published by authority of the Board of Trade, these subjects are classified, and each word or sentence has its appropriate symbol or group of letters prefixed. The ingenious arrangements by which simplicity in the act of signalising, and ease of reference and interpretation are secured, could not be made intelligible unless the reader had the book in his hand. But one feature of the system deserves special notice, namely—that it is oalculated to be *international.* The letters corresponding to the flags, not being used to spell words, but to signify things, their meaning is the same, whether displayed from an English or from a French ship; in the French signal-book, the meaning of the symbols would, of course, be expressed in French. This is a real step towards a universal language, and it is errnestly to be hoped, that, before long, the system will be in general use all over the world. The commercial code has been strongly recommended by the committee of Lloyd's, and by the Ship-owners' Associations of London and Liverpool; and active means are being taken to provide vessels with the necessary signals and books, and to secure its speedy and general adoption. It apears that the flags used in Marryat's code can, with the addition of four new ones, be applied to the commercial code, and that, sn the present state, captains of ships may, without much difficulty, avail themselves of either, as necessity requires.* It ought also to be mentioned, that a book of tables has been published, called the "Companion to the Commercial Code of Signals," and henceforth to form part of the library of every ship-captain; by means of which, one ship may communicate to another, in one signal of three flags, the latitude or longitude, a matter, often, of vital moment. Who will say, now, that mariners have not their telegraph, as well as landsmen?

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* See "Sea Signals Assimilated," (Charles Wilson, London,) a tract, containing a full account of the whole subject. It is drawn up, we oresume, under the auspices of Mr. J. H. Brown, Registrar-General of Seamen, who has been a prime mover in this and other recent measures for the improvement of our mercantile marine.

THE STEAM SLOOPS OF WAR.

The five steam sloops of war authorized by the late act of Congress, are now being constructed; four in the respective navy yards at Boston, Philadelphia, Gosport and Pensacola, while the one to be built by contract is also in a progressive state, by ex-Mayor Westervelt, at New York. The advertisement inviting proposals for the construction of this vessel, called for a limited draught of water, not exceeding sixteen feet, with equipment, stores, and armament on board. Reference was made to the Commandant's office, at the several navy yards, where the necessary amount of equipment and stores to be carried could be obtained from the allowance book, for all the different classes of vessels recognised in the Navy of the United States. We were at some pains to determine what space was required, with the weight of stores, equipment, etc., together with the internal capacity required for their stowage. We found the weight to be equal to 912 tons, of 2,240 pounds each; and in order to carry, and have distributing capacity for this allottment of stores, water, armament, engines, coal, etc., 3,000 tons of displacement is demanded. But the most remarkable feature in this connection, is the fact, that a large majority of constructors insist that 3,000 tons of displacement is too much; that vessels thus apportioned are too large, and will *draw too much water.* One of the gentlemen appointed by the Hon. Secretary of the Navy, to superintend the construction of the contracted vessel, insists that about 500 tons is the weight of the stores, equipment, etc., as per advertisement, allotted to this class. In reference to this question, we ask the nautical and ship-building fraternity to look after the draught of water of this vessel, when ready for sea, and they will be able to determine the reason why all our war vessels are of heavy draught, and *draw more water than is assigned them by the constructed line of flotation.* We are not aware of a single exception to this general rule in our Navy.

This is the first time in our experience, that any one could be found to assume, that an increase of size in a vessel, or an increase of length and breadth, rendered a vessel's carrying capacity less, other things being equal. We are aware of the general impression, that, if there is an inch of space to spare on board of a war vess , that it is sure to be more than filled by the exorbitant demands of l officers. But having had much to do with war vessels, and witne the continued series of changes and alterations after the construct een commenced, we still have yet to learn that a war vessel m be so constructed, that there will be a place for everything, and ever ing in its place; and all this be fully and fairly determined and apportioned, before the vessel is built, and any

infraction from the original design be fully rebuked. It was not for the purpose of compelling the department to build a larger vessel than was actually necessary to comply with the conditions of the advertisement, that the private builders exhibited plans for a vessel ranging from 2,850 to 3,150 tons displacement; but that the Government might have one vessel, at least, which did not exceed the draught of water determined upon by the calculations. The hypothesis upon which the requisite size of vessel was determined by the constructors, was that of a division into three equal parts of the entire load line displacement; 500 tons for the weight of vessel, 500 tons for engines, boilers, coal, etc., and 500 tons for stores, equipment, and armament. It was assumed, that an amount of displacement, not exceeding 1500 tons, could be secured within a draught of water not exceeding sixteen feet. How nearly that assumption will correspond with the *fact*, will be determined when the vessel is ready for sea.

If we were to inquire, *how much a vessel should be shortened, narrowed, and deepened, in order that she might have her draught of water reduced, one, two, or three feet*, we should be regarded as a fit subject for the lunatic asylum; and yet this same principle is boldly advanced, in the face of the largest amount of historical demonstrations, mechanical expositions, and physical facts the world has ever adduced, at any one place, or within any given period of its history. Since the days of Fulton, the mechanics of New York have been lengthening and widening steamboats to reduce their draught of water, and in every single instance the result has been as was anticipated—the vessel drew less water. Even the *Clermont*, Fulton's first steamboat, was widened, and drew less water after being widened, than she did before. But strange to say, that when the same material law of the universe (gravitation) is applied to war vessels, it is rejected, as being inadequate to fulfill its functions. In jurisprudence, one good and sufficient reason is enough, and is so regarded by the legal profession; but in mechanical science, it is necessary to add demonstration to testimony, to add proof to analysis, in order to raise a barrier against the heterogenous postulations so freely dispensed. As it regards the construetion of this vessel, we have little to fear; the contract price is amply sufficient to build as good a vessel of her size and class, as has ever been built; and if she is not, it will not be because the price is too small. The first bid was $412,000, but inasmuch as the specification was altered to suit the wants of the Department, the price was set aside, and the whole matter re-arranged. But if her draught of water does not exceed sixteen feet, it will be because of her having, when ready for sea, less weight on board, in equipment, stores, etc., than is apportioned to her class in the allowance book, or that she has less than a full proportion of power in engines and coal. There is a

vital principle involved in connection with the construction of this vessel. If small vessels are proportionately more capacious than large ones, it is high time that the world knew it.

If the weight of the hull increases faster than the buoyancy, (other things being equal,) in the construction of vessels, when the vessel is enlarged, then truly the naval constructors are right in their assumptions; or if the allowance of equipment and stores for a razee frigate, or a second class war steamer, does not exceed 500 tons, we ask, in behalf of the many interested officers of our Navy, who inquire of us—*why* do all our war vessels draw more water, when ready for sea, with their proper allowance on board, than was designed by their draft and calculations?

Our answer has been, to such inquiries, that the vessel is more weighty than has been assumed, and that the weight of the vessels built by the naval constructors has never been computed correctly, and on the part of the officers we have always assumed, that they exacted the full measure allowed by the Department, and often more, and that the weight of that allowance had never been properly determined. But it is not a question of weight only. There is a very large proportion of the stores of a vessel of war, that have comparatively but little weight, but which occupy a large proportion of bulk, and a very considerable amount of space is required to stow them, so that they may be accessible when required. We are aware that there has been an attempt, in one or two instances, to determine the weight of the stores and equipment of a certain vessel—the sloop of war *Albany's* equipment, stores, armament, rigging, boats and spars, were determined as they went on board, at the time of her first outfit, at the Brooklyn navy yard. But this was done without any special reference to future data; the ship was unlike any other vessel in the navy—she was a speciality, as her loss has fully proved, and consequently could furnish no reliable data for future reference.

Inasmuch as the contract steam sloop of war has less than 3000 tons displacement, and was among the smallest of those models offered for competition, she may be expected to draw more than sixteen feet water; whereas, if the constructor's estimate of 500 tons for the equipment, water, and stores, be correct, she should draw a very considerable less than sixteen feet, and thus the observer will be able to determine who is right in this matter, inasmuch as upon the draught of water depends the vitality of the Navy, not only of the United States, but of the world. The Government, we are glad to know, is awake to this subject, and have determined to make all future accessions tend to this, the only true prii ple in offensive or defensive warfare.

CAPITAL AND COMMERCE.

For the first time in the history of the United States, during a period of profound peace throughout the civilized world, do we find the moneyed institutions of the country groaning beneath an unwieldy bulk of bullion, inviting, by the most enticing means, its investment in the various channels of business. Strange to say, that, in a new country like the United States, where everything is, at best, but in a progressive and unfinished state, with a population proverbial for indomitable energy and persevering industry, capital is begging investment at the hands of our business men. There is, at this moment, no country on the globe where such ample returns are guarantied to capital, as in the United States. Even in the city of New York, where thirty-two millions of bullion lie dormant in the vaults of the banks, there is abundant scope for investing double the amount the banks now hold in trust for business purposes. It is only necessary for business men to abandon the fancy and frivolous, and take hold of the substantial. With but an ordinary share of discernment, no one can be mistaken as to the proper channels of investment, for all the capital the country may possess.

We are told that there is no demand for ships—that they are rotting at the docks, by hundreds; ocean steamers are not paying expenses, much less wear and tear, depreciation, and interest on investment. Hold, reader. This is all true, and we regret that it is so—that the warning voice of the press had not been heard in time to save at least a portion of this untimely and inconsiderate waste. The reader, if a capitalist, will not, we trust, have his nervous system shattered by the announcement we are about to make, viz:—*that there is as much necessity for the construction of vessels, as there has been within the last ten years.* We have ships in abundance, and why are they unemployed? Simply because they are not adapted to the service in which they might be profitably employed. Our sailing ships cannot fill the want, as general freighters, nor are they adapted to the transit of emigrants. Our clipper ships are too large for the specialities of that particular service—of small cargoes and long voyages—for which they were designed. They cannot be filled, and to go half full will not pay. Our ocean steamers are neither adapted to high speed, such as is needed for mail transit, nor are they adapted for the conveyance of first-class passengers, the accommodations being greatly beyond the demand, and as a consequence, the expenses exceed the income. Our coasting and lake vessels are the only ones which have an approximate adaptation to the service required.

But why, a friend at our elbow inquires, were these vessels built upon these false issues of adaptation? The answer is at hand—*the man of cap-*

ital and the man of genius are rarely found wearing the same hat; but, it is a most difficult matter to make the capitalist believe it. The capitalist, for want of genius, wears out and overruns the old channels, rather than to embark in new ones.

The present want of adaptation is fully portrayed in the history of the country. Whatever commercial enterprise is entered into, is pushed to its utmost limit. In this case, it is not by a disproportion in the number of vessels built, but by an increase of the size, far beyond a reasonable demand for exchangeable commodities in a single transaction. The Mediterranean trade, the Pacific trade, the East India trade, the West India trade, the South American trade, the Russian trade—all require vessels of special type and size, and in any of these, embarkation upon correct principles cannot fail to remunerate.

That Commerce is king, is as true to-day as it ever was. The products of the world lie open to American enterprise, in exchangeable commerce; but strange to say, we, as a people, prefer to understand the maxim in any other than its legitimate sense. We prefer to buy on credit, and pay in bullion, rather than to buy for the equivalent of *cash*, in the products of our own soil. There is no department of nautical commerce that is not open to the profitable investment of capital. Even the Guano Islands demand its outlay, in order that the ships may not be months, instead of days or weeks, in loading—a coasting vessel of suitable size, provided with steam power, both for propulsion and loading ships, would pay for herself in six months, at one of these guano islands. The fruit trade, although profitable in sailing vessels, under favorable circumstances, would be doubly so with steam propulsory power. England enjoys the Mediterranean trade unmolested, because the smallest of our clipper ships have no auxiliary steam power to compete with her; and because the necessity of mail facilities has not been pressed upon the notice of the government, with sufficient force to secure the extension. The whaling interests have not been sufficiently cared for; there is no department of commercial industry, that needs the attention of scientific men more than this. Steam should, by all means, be inducted into our whaling fleets. There should also be a steam tender accompanying them. It would cost nothing for fuel for making steam, if at all successful in finding whale.

The new Japan treaty opens a new trade for American commerce, while the kings of Siam are inviting our merchants to embark in the commerce of the eastern world, the Chinamen are warring with England and France. The South American republics hold out the sceptre of t invitingly to our merchants, while the Emperor of all the Ri ciates our gigantic commercial growth, by appropriating its historical importance to his own advantage, and at the sa

his willingness to reciprocate its benefits, by extending his commercial relations, through the more widely and more frequented channels of American trade. The whole world lays open to commercial enterprise, while capitalists are waiting to know what to do with their gold. Even the mail transit across the Atlantic, a contract for which, it is said, cost the owners of the Collins line six hundred thousand dollars, and which now has been forfeited, is a profitable investment, with a line of four steamers, *built for the purpose, on correct principles.* $200,000 per annum, for carrying a fortnightly mail to Liverpool, with 100 passengers, will pay all the expenses of the line, the repairs and depreciation, and reimburse the capital expended in their construction, within six years of the time of laying their keels.

But we have shown but one side of the question. Commerce by sea has always the advantage of commerce on land. Ocean commerce is the great natural channel of trade; it has made England what she is, and if the United States are to be the hope of the world, they can only be made so through the channels of flotative commerce. No country on the globe possesses equal advantages for commercial intercourse; having every variety of climate, soil, and production; and the only wonder, with the man of thought and observation, is, that their growth has not been more, instead of less rapid. It cannot be denied, that *the whole world are looking westward*, for lessons of profit, not only in political economy, but in developments of commercial and agricultural science. The United States, since their induction among the nations of the earth, have been the land of promise. They are destined to be the granary of the world—to feed the starving millions of Europe; and while they have the greatest area of tilable soil under cultivation, population considered, and still increasing the proportion, despite of the fall in stocks, or the depression of trade—they should have an increasing commerce to sustain it. *This commerce must and will be furnished;* if not by American, it will be by foreign capital, and the commercial marts will be filled, as they are now beginning to be, with foreign ships, to carry on the American trade.

But it may be said that when the demands of commerce are supplied, then there will still be a redundancy of capital. We say, no; let the thinking men of commercial cities, particularly of New York, look at the docks and piers of the commercial metropolis of America, and see if there is not room for a safe investment of at least thirty millions of dollars. It is a burning shame upon American enterprise, that all the marts of commerce have no better accommodations for ships than are furnished by cobb docks, made of soft timber. There is no unimproved real estate on the island of Manhattan, that will pay so large an interest on the investment, as the docks and piers, if placed under judicious improvement.

NOTICES TO MARINERS.

MEDITERRANEAN, BLACK, AND RED SEAS—VARIATION OF THE COMPASS.—The Hydrographer of the British Admiralty has published the following information respecting the Variation of the Compass in the Mediterranean, Black, and Red Seas, in order to apprize mariners of the gradual decrease in the variation, which, in many places, since the commencement of the present century, has amounted to more than half a point.

The average rate of annual decrease at the present time appears to be about 3′ at the western limits of the Mediterranean, 5′ in the central portion, 6′ in the eastern limits and the Black Sea, and about 7′ in the Red Sea.

SPAIN, FRANCE, AND ITALY.

Gibraltar	20 ° W.	Genoa	15⅓° W
Cape de Gat	19 ° "	Leghorn	15 ° "
Cape Antonio and Tarragona	18⅓° "	Naples	13¼° "
Barcelona and Cape Creux	18 ° "	Cape Spartivento	12⅓° "
Marseilles and Toulon	17 ° "	Gulf of Taranto	12 ° "

PRINCIPAL ISLANDS.

Port Mahon (Minorca)	17 ° W.	Malta	13¼° W.
Corsica and Sardinia	15⅓° "	East coasts of Sicily	12¾° "
Pantellaria, and west coasts of Sicily	14 ° "	Ionian Islands	10⅓° "

NORTH COAST OF AFRICA.

Cape Spartel	20 ° W.	Tripoli	18¾° W.
Cape Ferrat	18 ° "	Ben Ghazi	11 ° "
Algiers	17¼° "	Bombah	9¾° "
Cape Serrat and Galita Island	15¼° "	Alexandria	7¼° "
Cape Bon and Skerki Shoals	14⅓° "		

COASTS OF GREECE, ETC.

Corinth and Cerigo Island	9⅓° W.	Athens	9¼° W.

Archipelago in general from 9° to 8° W.

COASTS OF ASIA MINOR.

Dardanelles and Symrna	8 ° W.	Iskanderun Gulf	4 ° W.
Alaya in Karamania and west end of Cyprus Island	5¾° "	Arce	5 ° "

BLACK SEA.

Entrance to Bosphorus and Constantinople	7 ° W.	West coasts of Krimea	5 ° W.
Mouths of Danube	6⅓° "	Kertch Strait	8⅓° "
Odessa	6 ° "	Eastern or Circassian coast	2⅓° "
		Sinope	4 ° "

RED SEA.

Suez	6 ° W.	Jibbel Teer	4 ° W.
Kosseir	5⅓° "	Perim Island	4¼° "
Seberget Island	4⅓° "	Aden	2¾° "

Republished by order of the Light-house Board.
Washington, October 24, 1857.

MEDITERRANEAN—GIBRAL[illegible] THE NEW MOLE.—Official information has been receive[illegible] Superintendent of Her Majesty's Naval Yard at Gibraltar [illegible] after the 25th day of August, 1857. a temporary colored li[illegible] extremity of the new works now in course of constructio[illegible]; and in order that the tem-

porary light may be distinguished from the fixed red light at the original Mole Head, it will show a red, white, and green light, viz.:

Green to the north; White to the west; Red to the south.

By order of the Light-house Board.

Washington City, Oct. 24, 1857.

FIVE ADDITIONAL LIGHT-HOUSES ON THE WEST COAST OF SCOTLAND.—Official information has been received at this office that the Commissioners of the Northern Light-houses have given notice, that on the night of Tuesday, the 10th day of November next, and every night thereafter, from the going away of daylight in the evening to the return of daylight in the morning, lights will be exhibited from the undermentioned light-houses, the positions and characteristics of which have been specified by Messrs. David and Thomas Stevenson, the engineers to the board, as follows:

1. *Ushenish—South Uist.*—Ushenish light-house is situated on the most easterly headland on the eastern side of the Island of South Uist, one of the Hebrides, in the County of Inverness.

The light will be a dioptric first class fixed red light, and will be exhibited from a tower of masonry erected on the headland. The light will be about 176 feet above high water of spring tides, and will be seen in clear weather at the distance of about eighteen nautic miles, allowing ten feet for the height of the eye, and at lesser distances according to the state of the atmosphere.

2. *Rona.*—Rona light-house is situated on the northern end of the Island of Rona, in Inverness-shire, between the west coast of Ross-shire and the Island of Skye.

The light will be a catadioptric second class holophotal flashing white light, showing a flash every twelve seconds. It will be exhibited from a tower of masonry erected on a peak at the northeast point of the island. It is elevated about 222 feet above high water of spring tides. and will be seen in clear weather at the distance of about twenty nautic miles, allowing ten feet for the height of the eye, and at lesser distances according to the state of the atmosphere.

3. *Kyleakin.*—Kyleakin light-house is situated on a point of rock which covers at high water spring tides, and projects from the west end of Eilan Dool, or Gilleen island, in Ross-shire, at the western entrance of "The Narrows," leading to Loch Alsh. The tower is about fifty-three yards within the high water mark of spring mark of spring tides, and is connected with the island by a bridge of five spans.

The light will be an azimuthal condensing light, and will show a fixed white light in the fairway of the Sound of Loch Alsh, and a fixed white light in the fairway leading to the Sound of Applecross, and which white light extends southwards to Pabba island.

From thence it will show a fixed red light, extending eastwards along the shore of Skye to the south of the fairway of Loch Alsh. It will also show a fixed red light to the northeastwards of the fairway to the Sound of Applecross.

To the north of the fairway of Loch Alsh the light will not be shown.

It will be exhibited from a tower of masonry about 58 feet above high water of spring tides, and will be seen in clear weather at the distance of about eleven nautic miles, allowing ten feet for the height of the eye, and at lesser distances according to the state of the atmosphere.

4. *Isle Oronsay.*—Isle Oronsay light-house is situated on a low point at the southeast end of the Island of Oronsay, Inverness-shire, in the Sound of Skye, also called Sound of Sleat.

The light will be an azimuthal condensing light, and will show a fixed white light from a tower of masonry about 58 feet above high water of spring tides. The light will be seen in clear weather about twelve nautic miles, allowing ten feet for the height of the eye, and at lesser distances according to the state of the atmosphere.

5. *Sound of Mull.*—The Sound of Mull light-house is situated on a small rock called Runa Gall, on the south shore of the Sound of Mull, Argyllshire, about one mile northwards from Tobermory. The tower is about fifty yards within the high water mark of spring tides, and is connected with the shore by a bridge of two spans.

The light will be an azimuthal condensing light, and will show a fixed red light northwards out to sea; a fixed green light towards the New Rocks, the Red Rocks, and the Stirks Rocks, in the Sound of Mull; a fixed white light southwards into the Sound of Mull.

The light will be exhibited from a tower of masonry about 55 feet above high water of spring tides, and will be seen in clear weather at the distance of about twelve nautic miles, allowing ten feet for the height of the eye, and at lesser distances according to the state of the atmosphere.

By order of the Light-house Board.

Washington, October 26, 1857.

BOSTON HARBOR BUOYS—VINEYARD SOUND AND BUZZARD'S BAY BUOYS.—Notice is hereby given that the Nuns and Cans in Boston harbor will be removed for the winter, and their places supplied with spar buoys, which will be of corresponding numbers and colors.

That the Nuns and Cans in Vineyard Sound and Buzzard's Bay will be removed for the winter, and their places supplied with spar buoys of corresponding numbers and colors.

Boston, Nov. 3, 1857.

CHARLESTON LIGHT-HOUSE.—During the renovation of Charleston light-house the present revolving light will be put out and a fourth order fixed lens light substituted on the evening of November 20, (inst.,) 1857, and continued thereafter until January 1, 1858, when the new second order fixed Fresnel light will be exhibited for the first time and simultaneously with the exhibition of the revolving light at Cape Roman. This temporary fourth order fixed lens light will be placed upon a scaffold outside of the southeast face of the light-house tower, at the height of ninety (90) feet above the sea, which may be seen over 17 miles from the deck of a vessel 15 feet above the water.

GEO. W. CULLUM, Capt. U. S. Engineers.

Charleston, S. C., Nov. 4, 1857.

MEDITERRANEAN—CORSICA—FIXED RED LIGHT AT ISOLA ROSSA.—Official information has been received at this office that the French Government has given notice, that on and after the 1st day of October, 1857, a harbor light would be established on the highest point of the large islet of La Pietra, in advance of, and on the right hand of the entrance of the port of Isola Rossa, on the north coast of Corsica.

The light is a fixed red light; it is placed at an elevation of 180 feet above the level of the sea, and may be seen from the deck of a ship in clear weather at a distance of 6 miles.

The light tower is 33 feet high above the ground, and stands in lat. 42° 38′ 50″ N., long. 8° 55′ 44″ east of Greenwich.

THORNTON A. JENKINS, Secretary.

Office L. H. Board, Washington, Nov. 7, 1857.

MEDITERRANEAN—COAST OF SPAIN—REVOLVING LIGHT ON CAPE SAN SEBASTIAN.—Official information has been received at this Office, that the Minister of Marine at Madrid has given notice that on and after the 1st day of October, 1857, a light would be exhibited from a light-house recently built on Cape San Sebastian, in the province of Gerona, Catalonia.

The light is a bright revolving light eclipsed once a minute. It is placed at an elevation of 555 English feet above the level of the sea, and should be visible from the deck of a ship in ordinary weather at a distance of about 22 miles. The illuminating apparatus is catadioptric of the first order.

The light-house stands near the hermitage of San Sebastion, and is in lat. 41° 53′ 30″ north, long. 3° 12′ 22″ east of Greenwich. The form, color, and height of the light-house are not stated.

This light serves to enable vessels to avoid the Hormigas or Ar[illegible] most of which lies at 2½ miles south of the light-house, and the east[illegible] from Punta del Termino or Castell.

Th[illegible]

O[illegible] L. H. Board, Nov. 7, 1857.

SOUTH AUSTRALIA—PORT PHILLIP—TEMPORARY I[illegible]
Official information has been received at this office th[illegible]
Port Phillip, have given notice that a light-vessel [illegible]
Bird rock, on the port side of the channel leading [illegible]
tion hitherto occupied by the Second black buoy,

The light is white, fixed, and elevated 27 feet above the sea; and it may be seen from the deck of a small vessel at a distance of 9 miles in clear weather.

The light-ship lies in 12 feet at low water, with the following bearings:

Outer red dolphin, upon which a red ball has been placed, N. 82° W.; beacon on Bird rock, S. 89° E.; white buoy off Bird rock, S. 54° E.; red buoy off point Wilson, S. 87° E.; white buoy off point Wilson, S. 52° E., and point Henry, S. 4° W.

Should the light-vessel break adrift or be otherwise snifted from her moorings, the white light will be discontinued, and two red lights exhibited instead by night, and a large white flag by day.

The following tidal signals will be made from the light-vessel by day to indicate the depth of water on the bar:

One blue flag, 10 feet; one ball, 10½ ft.; ball with blue flag over, 11 ft.; ball with blue flag under, 11½ ft.; two balls, 12 ft.; two balls with blue flag under, 12½ ft.; two balls with blue flag over, 13 ft.; two balls with red flag under, 13½ ft.; two balls with red flag over, 14 ft.; two balls with red flag between, 14½ ft.; red flag, 15 ft.

All bearings are magnetic. Variation 8° east in 1857.

THORNTON A. JENKINS.

Office Light-house Board, Nov. 7. 1857.

Notice is hereby given, that the Minot's Ledge Light Vessel, having been thoroughly repaired, has been replaced on her station, and the Relief Light Vessel removed.

C. H. B. CALDWELL, L. H. Ins., 3d Dist.

BOSTON, Nov. 7, 1857.

SCOTLAND—EAST COAST—ALTERATION IN COLOR OF BUOYS.—Official information has been received at this office, that the Commissioners of Northern Light-houses have given notice, that in adopting a uniform system in coloring the buoys under their direction, by which arrangement vessels entering a harbor should keep red buoys on the starboard hand, and black buoys on the port hand, while chequered buoys indicate centre patches,—the following changes have been made in the colors of the undermentioned buoys:

Dornoch Firth.—Tain bar inner buoy, north side, from black to red. Tain bar inner buoy, south side, from red to black.

Cromarty Firth.—Nigg sand buoys, from black to red. Newhall buoy, from red to black.

Moray Firth.—Whiten Ness sandhead buoy, from red to black.

Inverness Firth.—Craig Mee buoy, from red to black. Skate bank buoy, from black to red. Munlochy buoy, from black to chequered red and white. Petty bank buoy, from red to black. Middle bank buoy, from black to red. Meikle Mee buoy, from black to red.

THORNTON A. JENKINS, Secretary.

Office Light-house Board, November 16, 1857.

SCOTLAND—NORTH AND WEST COASTS.—*Beacon on Stroma Skerries, Pentland Firth.*—Official information has been received at this office, that the Commissioners of Northern Light-houses have given notice, that a beacon has recently been erected on the southwest extremity of the Skerries of Stroma, which extends from the southeastern side of Mallit Head on the island of Stroma, in the Pentland Firth, and are covered by the sea at high water.

The beacon consists of an open frame-work of iron, surmounted by a cylindrical cage; in all 40 feet above high water, and painted red.

Beacon on Bo Caolas, Loch Inver.—Also, that a beacon has been erected on Bo Caolas, a rock which is covered at high water, and lies at the entrance to Loch Inver, on the west coast of Sutherlandshire.

The beacon is composed of cast iron pillars surmounted by a cylindrical cage; it is elevated about 30 feet above high water, and painted red.

Beacon on Screen Rocks, Whithorn.—A beacon has also recently been placed on the Screen rocks, at the entrance to the port of Whithorn, on the southeastern coast of Wigtonshire.

This beacon is of iron, with a barrel top, and painted red.

THORNTON A. JENKINS, Secretary.

Office Light-house Board, Nov. 16, 1857.

LIGHT-HOUSE ON TATOOSH ISLAND, OFF CAPE FLATTERY, ENTRANCE TO THE STRAITS OF FUCA, AND LIGHT-HOUSE ON NEW DUNGENESS POINT, IN THE STRAITS OF FUCA—WASHINGTON TERRITORY.—*Light-house on Tatoosh Island.*—A light will be exhibited on and after the 28th of December next, in the light-house recently erected on the highest part of this Island. The light is a fixed white light of the 1st order of Fresnel, and elevated 162 feet above mean sea level, and should be seen in clear weather, from the deck of any sea-going vessel, 19 nautical, or 22 statute miles. The structure consists of a keeper's dwelling of stone, with a tower of brick, whitewashed, rising above it, and surmounted by an iron lantern painted red; the entire height being 66 feet.

The latitude and longitude and magnetic variation of the light, as given by the Coast Survey, are: Lat. 48° 23′ 15″ N.; lon. 124° 43′ 50″ W.; magnetic variation, 20° 45′ E. (July, 1851.)

Light-house on New Dungeness, Straits of Fuca.—A light will be exhibited on and after the 14th of December next, in the light-house recently erected about one-sixth of a mile from the outer end of this Spit. The light is a fixed white light, of the 3d order of Fresnel, and elevated 100 feet above mean sea level, and should be seen in clear weather, from the deck of any sea-going vessel, 15 nautical, or 17½ statute miles. The structure consists of a keeper's dwelling of stone, with a tower of brick—the upper half colored dark lead, the lower half white—rising above it, and surmounted by an iron lantern painted red; the entire height being 92 feet.

The approximate latitude and longitude and magnetic variation of the light, as given by the Coast Survey, are: Lat. 48° 11′ 45″ N. long. 123° 07′ 30″ W.; magnetic variation, 21° 30′ E. (Aug., 1852.)

A fog-bell, of 1100 pounds, has also been placed on the extreme outer end of the Spit, which will be sounded during foggy or other thick weather, night and day, from the same date. The distinctive mode of striking the bell will be published hereafter. The striking machinery is in a frame building with the front open to receive the bell, painted black, raised 30 feet above the ground on an open structure, whitewashed.

HARTMAN BACHE, Maj. Topog'l Eng'rs, Bt. Major.

Office Twelfth Light-house District, San Francisco, Cal., Nov. 20, 1857.

VINEYARD SOUND ("SOW AND PIGS") LIGHT VESSEL.—Notice is hereby given, that the Vineyard Sound Light Vessel, off "Sow and Pigs," has been relieved by the light vessel "Relief," and removed to New Bedford for repairs.

The "Relief" is schooner rigged, with a red ball at each mast head; hull painted red, with "Relief," in white letters on each side. She will show every night, from sunset to sunrise, two fixed lights, of the natural color.

When the Vineyard Sound Light Vessel is repaired, she will be restationed, of which due notice will be given.

MELANCTHON SMITH, Comdr. U. S. N., Lighthouse Inspector, 2d Dist.

Boston, Nov. 20, 1857.

The Light Ship on the English Bank is anchored in seven fathoms water, in lat. 35° 06′ S., and lon. 55° 55′ W. of Greenwich, bearing by compass as follows, viz.:—From Light Ship to the Mount, N. 63 W. From Light Ship to Island of Llores, N, 20 W. From Light Ship to Sugar Loaf, N. 50 E.

A stationary white light visible from 3 to 4 leagues.

CONSULATE OF THE UNITED STATES,
MONTEVIDEO, Nov. 21, 1857.

The above mentioned Light Vessel has been placed and moored as stated, within days past, and, being a fixed light, cannot be taken for that on the Island of Flores,

revolves. Another light it is said will be placed on the Island Lobos, near Cape St. Mary's, at an early period, and when executed the navigator will be enabled to conduct his ship from the entrance of the river to Montivideo with perfect confidence and safety. The light money has been established at 75 reis, or 7½ cents per ton, upon all vessels entering the River Plate, the collection of which commenced on this day. Very respectfully, your obedient servant,

WM. HAMILTON, United States Consul.

To Ellwood Walter, Esq., Secretary Board of Underwriters, New York.

Notice is hereby given that the Relief Light Vessel, which parted her moorings on the 20th inst, while stationed off the Sow and Pigs Ledge, has been returned to her station.

MELANCTON SMITH, Lighthouse Insp. 2d dis.

Boston, Nov. 25, 1857.

SCOTLAND—WEST COAST.—*Buoy on McMillan Rock, Sound of Raasay.*—Official information has been received at this office that the commissioners of Northern Light-houses have given notice, that a chequered black and white buoy has been moored close to the southward of McMillan rock, in the narrows of the Sound of Raasay, with the following bearings:

Macqueen's Farm-house in line with School-house in Skye, W. ¼ N.

Northeast wing of new house or villa in Raasay, in line with northwest angle of wall enclosing field and house, S E by E ½ E.

Shoalest part of McMillan rock, N ½ E about a quarter of a cable's length.

Buoy on Gulnare Rock, Inner Sound.—Also that a red buoy has been placed on the south side of Gulnare rock, lying about half a mile off the northeast side of Scalpa island, Inner sound, and from which the following bearings were taken:

Cairn on the top of Ben Clachan, Applecross, in line with middle of beach on Skerndenrick, N E 3-4 E.

Knoll on top of the west shoulder of Cnoc na Coinneach, in line with south point of Eilean Longa, S S E ½ E.

Round knoll in Skye, in line with southwest point of Raasay and first cliff above high water mark, north extremity of Scalpa, N W by W.

Sgier-Rat, Oban Bay—Alteration in Color of Buoys.—To follow out the arrangement now generally recognised, whereby vessels entering a port must keep red buoys on the starboard hand and black buoys on the port hand, while chequered buoys indicate centre dangers, the following changes have been made in the color of the buoys on the Sgier-rat, Oban bay, Sound of Kerrera:

Northeast buoy, from chequered black and white to chequered red and white.

Southwest buoy, from red to chequered black and white.

All bearings magnetic. Variation 27° 20′ West in 1857.

THORNTON A. JENKINS, Secretary.

Office Light-house Board, Washington, Nov, 28, 1857.

ENGLAND—WEST COAST—LIVERPOOL BAY.—Official information has been received at this office that the Trustees of the Liverpool Docks and Harbor have given notice that on the 12th of October and following days the undermentioned changes would be made in lighting and buoying the approaches to the port of Liverpool.

Formby Light-Vessel.—The Formby light-vessel, which was moored in the fairway between Taylor bank and West Middle shoal, in the approach to the river Mersey, would be N W ¾ N, one mile to the elbow of the Queen's and Crosby channels, in 22 feet at low water, with the following bearings and distances: Crosby L. H., S E by E, ¼ easterly, 4¼ miles; Crosby light-vessel S E ½ S, nearly three miles; N W mark E by N northerly, 4 1-8 miles; Q fairway buoy, N W by W, ¼ W westerly, nearly 1 ¾ mile; V 3, red can buoy, S by W westerly, nearly ½ a mile; V 8, black nun buoy, S W ½ a mile.

Buoys Changed in Position.—Q Fy, black pillar buoy would be moved N W ¼ W, 155 fathoms, into a depth of 5 fathoms, at low water, with Formby light vessel and Crosby L. H. in line S E by E, ½ E easterly, distant 1 5-8 mile from the former; bell beacon and N W light vessel in line S W ¼ W, nearly, and distant one mile from bell beacon.

Q 1, ehhequered red and white can buoy would be N W ¼ W, about 8½ cable's length

into a depth of 11 ft., with Formby light vessel E S E $\frac{1}{2}$ E one mile; Q Fy, buoy N W $\frac{3}{4}$ W $\frac{1}{2}$ a mile; Q 1, black and white nun buoy N N E 3-8 of a mile.

Q 1, chequered black and white nun buoy would be moved N W by W $\frac{3}{4}$ W, about four cables' lengths, and moored in 11 feet, with Formby light vessel S E $\frac{1}{2}$ E, one mile; Q Fy, buoy W N W $\frac{3}{4}$ W, 5-8 of a mile; and Q 1, red and white can buoy S S W 3-8 of a mile.

V 2, black nun buoy would be moved S W 32 fathoms into a depth of 25 feet, with bell beacon W N W nearly $1\frac{1}{4}$ mile; Crosby light house W N W $\frac{1}{4}$ W, and V 3, black buoy E $\frac{1}{4}$ N about $5\frac{1}{2}$ cables' lengths.

V 3, red can buoy N E by N 30 fathoms into 12 feet, with Formby light vessel bearing N by E easterly, distant 3-8 of a mile; V 3, black nun buoy W $\frac{1}{4}$ of a mile; and C 1, red can buoy S E by E easterly, 5-8 of a mile.

S V 1, striped horizontally red and white can buoy would be moved N W by W 1-3 W 185 fathoms, and moored in 12 feet with S V 1, striped horizontally red and white nun buoy N E $\frac{3}{4}$ N nearly 2 cables' lengths; V 2, red can buoy W by N nearly $\frac{3}{4}$ of a mile, and C 1, red can buoy E by N northerly, nearly $\frac{1}{2}$ a mile.

V 4, red can buoy would retain its position and color, but its denomination would be changed to C 1.

C 1, red can buoy, hitherto, would be denominated C 2, and moved E S E $\frac{1}{4}$ E, nearly $1\frac{3}{4}$ cables' length into a depth of five fathoms, with C 1, red can buoy N. W. $\frac{3}{4}$ N one mile; C 3, red can buoy with perch, S E $\frac{1}{4}$ E, $\frac{3}{4}$ of a mile; C 2, black nun buoy N by E nearly $\frac{1}{2}$ a mile.

C 3, red can buoy with perch would be shifted in a N N W $\frac{1}{4}$ W direction nearly $3\frac{3}{4}$ cables' lengths, and placed in $7\frac{1}{4}$ fathoms, with Crosby light vessel E S E nearly 1-3 of a mile; C 4, red can buoy S by E $\frac{1}{2}$ E $1\frac{3}{4}$ mile; and C 3, black nun buoy N by W $\frac{1}{2}$ a mile.

C 4, red can buoy would be moved N N W $1\frac{1}{4}$ cables' length into a depth of four fathoms, with C 3, red can buoy with perch N by W $\frac{1}{2}$ W $1\frac{3}{4}$ mile; C 5, black nun buoy N E $\frac{1}{4}$ E nearly one mile; and C 6, black nun buoy S E $\frac{1}{2}$ E nearly $1\frac{1}{4}$ mile.

F 2, red can buoy would take the position of F 3 red can buoy.

F 3, red can buoy with perch would be moved S $\frac{1}{2}$ W 1 1-3 mile, and moorod in 3 feet at low water off the south spit of Jordan bank on the north-western side of the entrance to Formby Pool from Crosby Channel, with C 4, black nun buoy S S W one mile; F 2, red can buoy N $\frac{1}{2}$ E nearly 1-3 of a mile; Formby life-boat flag-staff N E $\frac{3}{4}$ E; F 2, black nun buoy N E $\frac{1}{2}$ N rather more than $\frac{1}{2}$ a mile.

K 1, black nun buoy would be moved W $\frac{1}{4}$ N nearly 4 1-3 cables' lengths to the western extremity of the shoal part of the Newcome knoll, with N W light vessel W $\frac{1}{2}$ N 2 miles; Bell boacon N by E $\frac{1}{2}$ E easterly, $2\frac{3}{4}$ miles; and H 1, chequered black and white nun buoy S $\frac{3}{4}$ E $2\frac{1}{4}$ miles.

New Buoys.—Q 2, chequered black and white nun buoy would be placed on the south-western edge of Zebra flat, in a depth of 11 feet at low water, with Formby light vessel S E $\frac{1}{2}$ a mile; Q 1, chequered black and white nun buoy N W by W nearly $\frac{1}{2}$ a mile; and Q 2, chequered red and white can buoy S W by S 3-8 of a mile.

Q 2, chequered red and white can, placed on the north-eastern edge of Little Burbo, in 12 feet, with Formby light vessel E $\frac{1}{2}$ a mile; Q 1, red and white can buoy N W by W $\frac{1}{2}$ a mile; Q 2, black and white nun N E by N, 3-8 of a mile.

F 2, black nun buoy in six feet, on the north-west side of the northern spit of Formby bank, and west side of the entrance to the new cut, with F 2, red can buoy N W by W $\frac{1}{2}$ W nearly one mile; F 3, red can buoy S W $\frac{1}{2}$ S $\frac{1}{2}$ a mile; Formby life-boat flag-staff N E by E $\frac{3}{4}$ E nearly one mile.

B P, chequered black and white nun buoy on shoalest part of Beggar's patch, with Spencer spit buoy W by N 1 1-8 mile; Leasowe light house S by E $\frac{1}{2}$ E 1 1-8 mile; and R 2, red can buoy S E by E $\frac{3}{4}$ E $\frac{1}{2}$ a mile.

Buoys Removed.—In consequence of changes in the banks, the following now rendered unnecessary, or inconveniently placed, and would, therefore, be ere requisite, superseded by new arrangements:

C 2, red can. F 4, red can. Z 1, black and white striped horizo and white chequered nun. B 2, black and white chequered nun.

These alterations make the Queen's channel the channel to toria channel the positions of the buoys are adapted to the general arrangement is maintained as before. It may being taken to make due allowance for the tide, which

this channel and over the banks on either side of it. The navigation of the Crosby channel, in thick weather, will be facilitated by equalising the distances and straightening the line of buoys.

Directions.—From a position two miles north of Point Lynas to the fairway buoy of the Queen's channel is E S E ½ E 39 miles, that line of bearing passing four miles north of the N W light vessel, and ¾ of a mile north of the bell beacon. From the fairway buoy the Formby light and Crosby shore light must be kept in line bearing S E by E ½ E easterly, which leads in the fairway of the Queen's channel, with not less than 10 feet water over the bar. The Formby light vessel must always be passed on her southwest side. The tide sets fair through the Queen's and Crosby channels.

From the Queen's channel northward to the line of Zebra buoys, the bottom consists of ridges of sand, carrying a depth of five to nine feet at low water; this part may be navigated after half flood by vessels drawing from 16 to 17 feet.

The new buoy on Beggar's patch should be given a wide berth.

All bearing are magnetic. Variation 24° west in 1857.

Office Light-house Board, Washington, Nov, 28, 1857.

LAUNCHES.

At Searsport, Nov. 17, by Mr. McGilvery, ship Matilda, 850 tons.
At Orland, Nov. 17, by Emerson & Powers, bark Forest Belle, 380 tons.
At Cherryfield, Nov. 2, by S. Kinsley and Capt. Leighton, brig Naiad 335 tons.
At Ellsworth, Nov. 2, by D. P. Jordan, brig Ortolan, 346 tons.
At Thomaston, Nov. 6, by Chapman & Flint, ship Frank Flint, 1200 tons.
At Damariscotta, Nov. 17, by Metcalf, Norris & Co., a ship of 800 tons.
At Milford, Del., early in December, schooner J. F. Durfee, 250 tons.
At Baltimore, Dec. 1, by Cooper & Brother bark Gen. John Striker, 400 tons.
At Wilmington, Del., Dec. 1, ship Esther, 650 tons.
At Bath, Dec. 3, by Wm. M. Rogers & Son, ship Confidence, 668 tons.
At Kennebunckport, Nov. 2, by K. Ship-Building Co., ship Harvest, 640 tons.
At Bath, Dec. 21, by James & Cox, ship Tubal Cain, 528 tons.
At Cumberland, in December, by David Spear, bark Liberty, 374 tons.
At Freeport, recently, by Capt. Enoch Talbot, ship Enoch Talbot, 1000 tons.
At Quincy, Dec. 24, by George Thomas, ship Gerbane, 1400 tons.
At Barneysville, early in November, by Mason Barney, a ship of 1100 tons.
At Chelsea, early in November, by Taylor & Brother, ship Alice Munroe, 1400 tons.
At New York, Nov. 25, by Rosevelt, Joyce & Co, bark Benefactor.
At Wiscasset, Dec. 1, by Mr. Carleton, schooner Independence, 130 tons.
At New York, Dec. 10, by Mr. Westervelt, propeller Huntsville, 850 tons.
At Greenport, L. I., early in Dec., by Wells & Carpenter, bark Jane E. Bishop, 400 tons.
At Trenton, Nov. 19, by King Bros., schooner Springbok, 112 tons.
At Mystic Bridge, Dec. 16, by George Greenman & Co., a ship of 1500 tons.
At Damariscotta, Dec. 2, by Joseph Day, ship Success, 1200 tons.
At Philadelphia, Dec. 8, by Mr. Cramp, a propeller of 600 tons, for Cuba.
At Sedgwick, Nov. 3, by Daniel M. Means, bark Fanny, 400 tons.
At Patchogue, Nov. 14, by Hiram Gerard, schooner Lone Star, 300 tons.
At Richmond, Nov. 14, by George H. Farrin, ship Atlanta, 1000 tons.
At New Bedford, Nov. 17, bark John P. West.
At Black Rock, Nov. 17, by M. Hale, brig Costa Rica, 300 tons.
At Bath, Jan. 11, by W. V. Moses & Sons, ship Frank Haynie, 1035 tons.
At New York, Jan. 9, by Mr. Westervelt, propeller Montgomery, 850 tons.
At Quincy Point, early in January, by Isaac Taylor, ship E, F. Gabain, 1300 tons.
At Bath, Jan. 15, by Trufant, Drummond & Co., a ship of 1000 tons.
At Bath, Jan. 19, by Hall, Snow & Co., ship Bullion, 532 tons.
At Harpsewell, Jan. 4, by Curtis & Estes, a bark of 350 tons.
At Baltimore, Jan. 16, bark Clarissa, 358 tons.
At Westbrook, recently, by Ralph Kelly, ship Martha Wenzel, 580 tons.

OUR STATE ROOM.

ERRATA.—In our Feb. number, on page 107, first line, read 10,000 tons instead of 1000. On page 113, last line but one, about steamer *Adelaide*, read, best speed 18 nautical miles, instead of 8 nautical miles—caused by the dropping out of the type.

THE NIAGARA.—The Navy Department having consented to the use of this vessel for a second expedition in assisting in the Telegraph Cable Expedition, she has been fitted out at the Brooklyn Navy Yard, under the direction of B. F. Delano, Esq., Naval Constructor, and is now under sailing orders for England. Her spars and rigging, against the quality of which, there appears to have been just ground for complaint, have been overhauled, and with decided advantage. The main mast of this vessel should not stop at its present locality, forward of the engines, and we think that time will show the correctness of our conclusions, by the abrasion of the journals in its immediate vicinity. The general arrangements for stowing the telegraph cable, made in England; are good, as also the truss arrangement for supporting the beams. The stowage capacity is equal to about 1200 tons weight of telegraph cable, which, together with coal, water, provisions for 404 officers and men, etc., will bring her down to about 26 feet draught of water. It is not contemplated to make an effort to determine the speed of the *Niagara*, in going to her port of destination, nor yet with the cable on board; but when the cable is laid, and the vessel is homeward bound, then it is proposed, if practicable, to test her powers of speed. It is to be regretted that a fast model should have been assigned an auxiliary apportionment of power, and that she should have been provided with such an inefficient screw as the Griffith propeller has been proved to be. We are glad to know that she has been provided with the marine velocimetre, similar to that on the steamer *Moses Taylor*, which will afford material aid in determining the qualities of the ship. We hope the engineers will be able to furnish a favorable report to the Department, notwithstanding the considerable amount of refuse coal from the Crimea, they have been compelled to carry. The following is a list of her officers. Those having asterisks prefixed to their names were on the first expedition. Captain, *Wm. L. Hudson; 1st Lt., *Jas. H. North; 2d Lt., *Joshua D. Todd; 3d Lt., *John Guest; 4th Lt., Wm. A. Webb; 5th Lt. *E. Y. McCauley; 6th Lt. and Acting Master, Bancroft Gherardi; Surgeon, D. S. Green; Purser, *J. C. Eldredge; Lt. commanding Marine Guard, *Wm. Stokes Boyd; P. A. Surgeon, F. M. Gunnell; A. Surgeon, Wm. G. Hay; C. Engineers, J. Follansbee, *J. Faron; 1st Assist. Engineer, Wm. S. Stamm; 2d do., G. R. Johnson, *M. Kellogg; 3d do., *J. McElmell, *G. F. Kutz, Wm. G. Buehler, J. H. Barly; Captain's Secretary, *J. W. Hudson; Purser's Clerk, *E. Willard; Boatswain, *Robert Dixon; Gun-